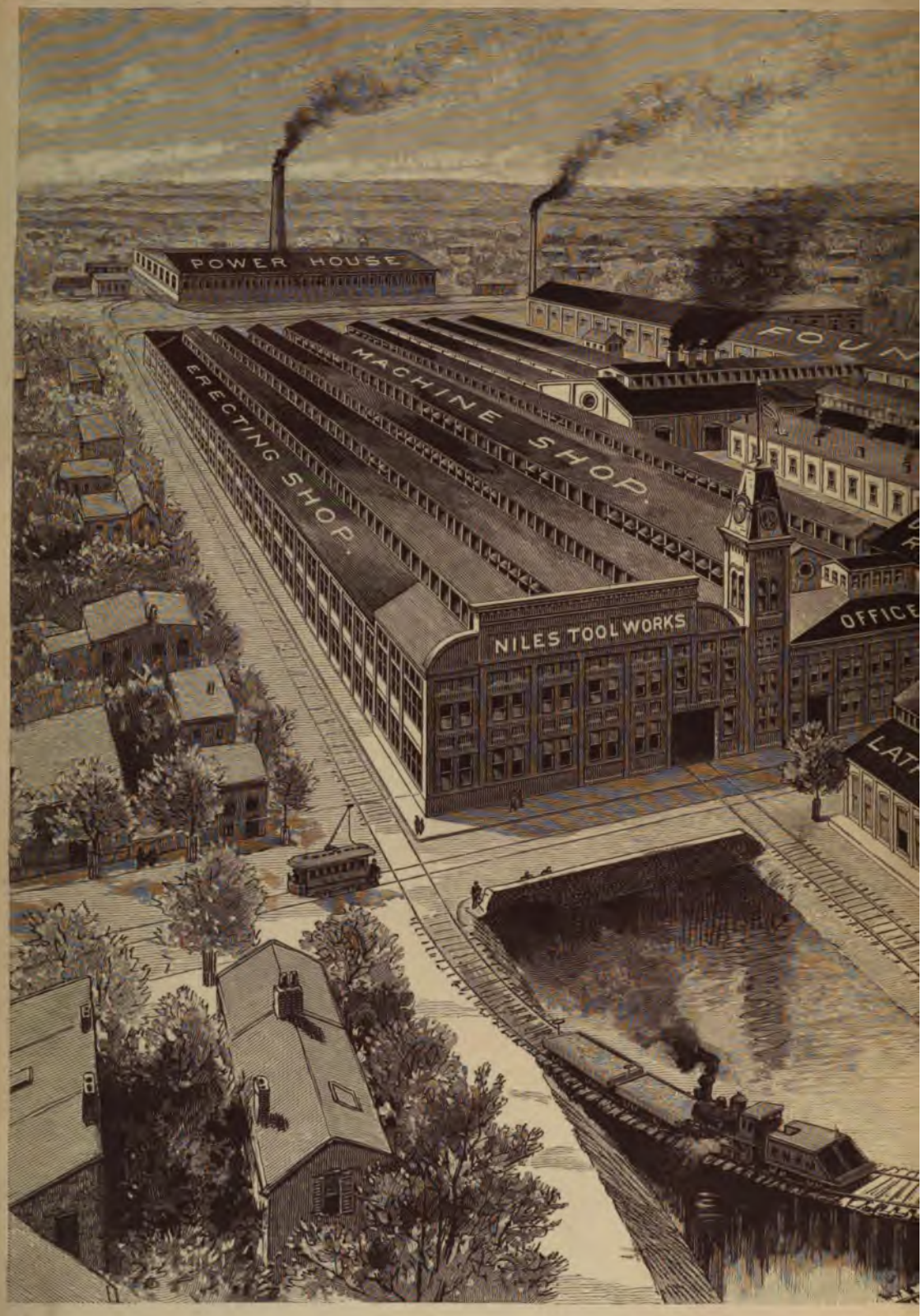
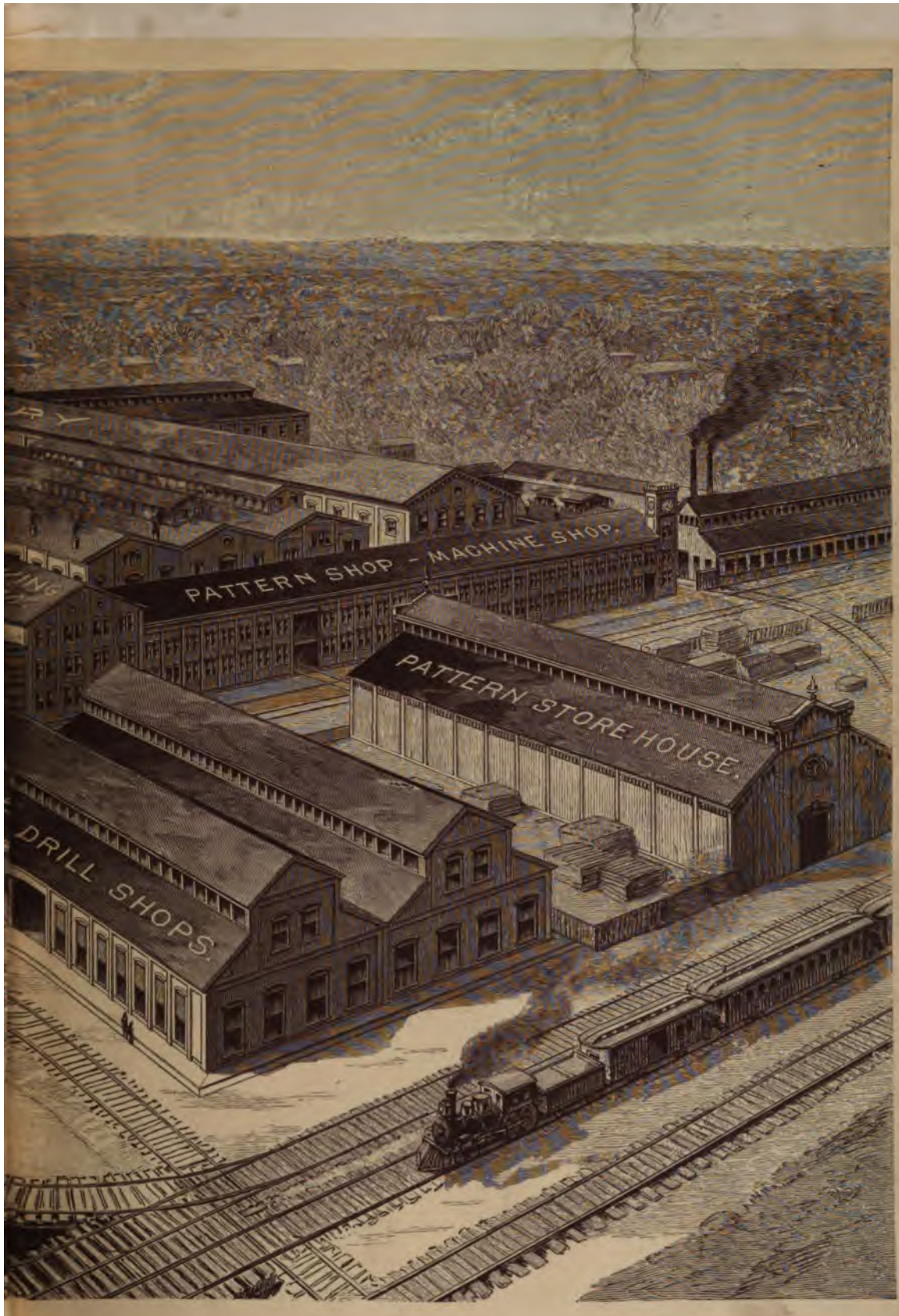


VIEW OF NILES TOOL W


PATTERN SHOP - MACHINE SHOP.
PATTERN STORE HOUSE.
DRILL SHOPS.

ALEXANDER GORDON,
PRESIDENT.

ROBT. C. McKINNEY,
SEC. AND TREAS.

CATALOGUE

OF THE

NILES TOOL WORKS,

MANUFACTURERS OF

IRON AND STEEL WORKING MACHINERY, RAILWAY,
CAR, BOILER AND MACHINE SHOP
EQUIPMENTS.

1891.

HAMILTON, OHIO,
U. S. A.

BRANCH HOUSES

OWNED AND OPERATED BY THE COMPANY.

NEW YORK, 136 and 138 Liberty Street.

PHILADELPHIA, 705 Arch Street.

CHICAGO, Phenix Building.

PITTSBURGH, Lewis Block.

Illustrated and Printed for NILES TOOL WORKS by McDONALD & EICK, Cincinnati.

NOTES.

ILLUSTRATIONS.

THE ILLUSTRATIONS GIVEN IN THIS CATALOGUE CORRECTLY REPRESENT THE TOOLS AT THIS TIME. CHANGES AND IMPROVEMENTS ARE BEING MADE FROM TIME TO TIME, AND PHOTOGRAPHS ILLUSTRATING THE LATEST IMPROVEMENTS WILL ACCOMPANY ALL PROPOSITIONS FOR TOOLS.

PRICES.

NET PRICES WILL BE QUOTED UPON INQUIRY.

DELIVERY.

TOOLS WILL BE DELIVERED FREE ON BOARD AT OUR WORKS. FOR EXPORT SHIPMENT BOXING WILL BE CHARGED EXTRA AT COST.

TERMS.

UNLESS OTHERWISE AGREED, TERMS ARE CASH 30 DAYS FROM DATE OF INVOICE.

CONTENTS.

PAGE.

PART I.—RAILROAD WHEEL AND AXLE MACHINERY.
Wheel Lathes—Car Wheel Lathes—Cutting-off Lathes—Quartering Machines—Axle Lathes—Wheel Presses—Car Wheel Borers, ... 11

PART II.—SCREW MACHINES, ... 39

PART III.—LATHES, ... 67

PART IV.—PLANERS, ... 85

PART V.—SHAPERS AND SLOTTERS, ... 107

PART VI.—BORING AND TURNING MILLS, ... 125

PART VII.—SPECIAL BORING MACHINES.
Turret Boring Machines — Chord Boring Machines — Cylinder Boring Machines—Horizontal Boring, Drilling and Milling Machines—Horizontal Boring and Drilling Machines — Double Boring Machines — Crank Boring Machines, ... 147

PART VIII.—DRILLING MACHINES.
Vertical Drills—Radial Drills—Arch Bar Drills—Safe Door Drills—Multiple Drills—Car Wheel Drills—Rail Drills—Multiple Drilling and Tapping Machine, . 177

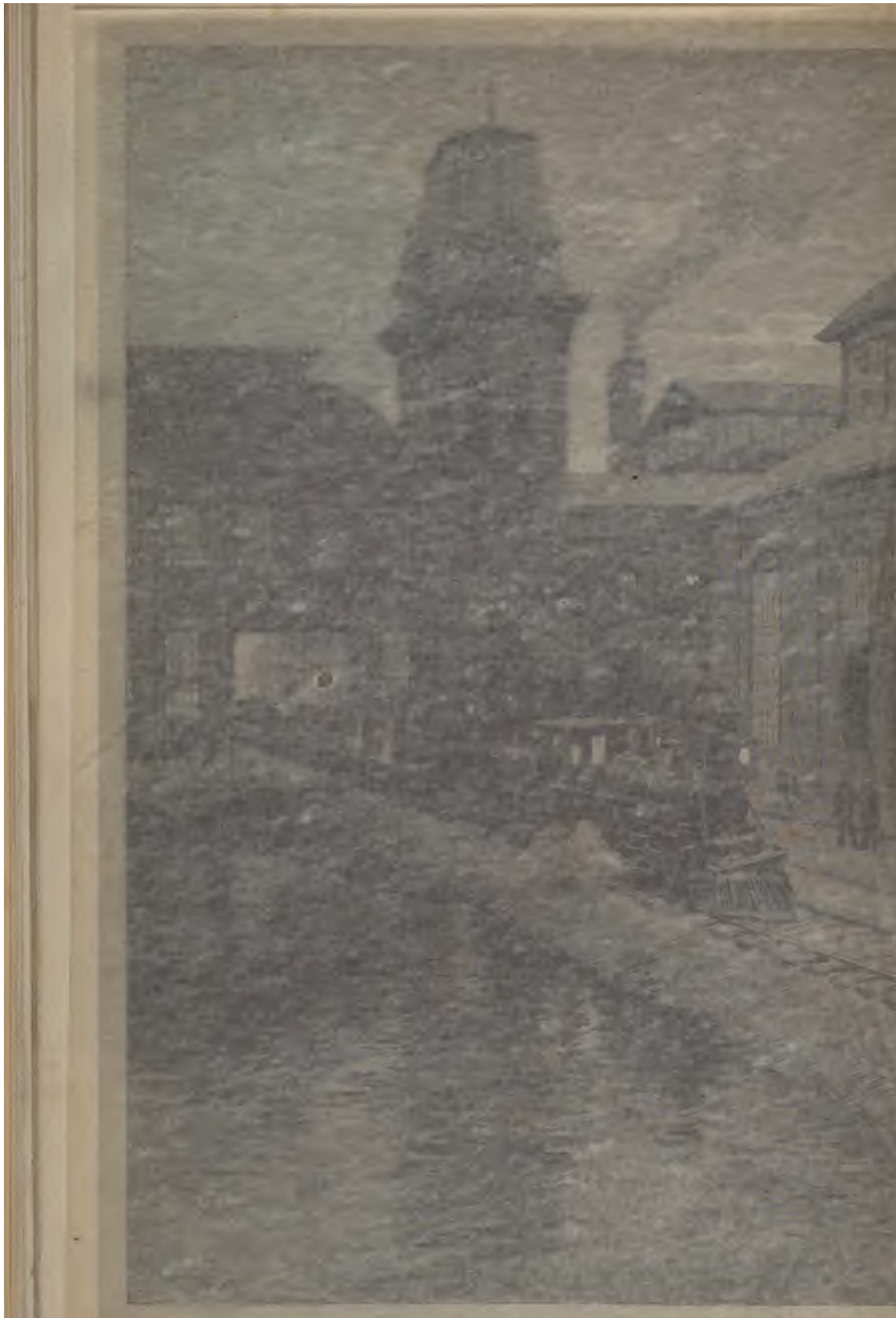
PART IX.—PULLEY MACHINERY, ... 209

PART X.—BENDING AND STRAIGHTENING ROLLS, . . 219

PART XI.—MISCELLANEOUS, ... 237

INDEX.

A complete index will be found in the back of this book.



MAIN ENTRANCE TO NILES WORKS.

INTRODUCTORY.

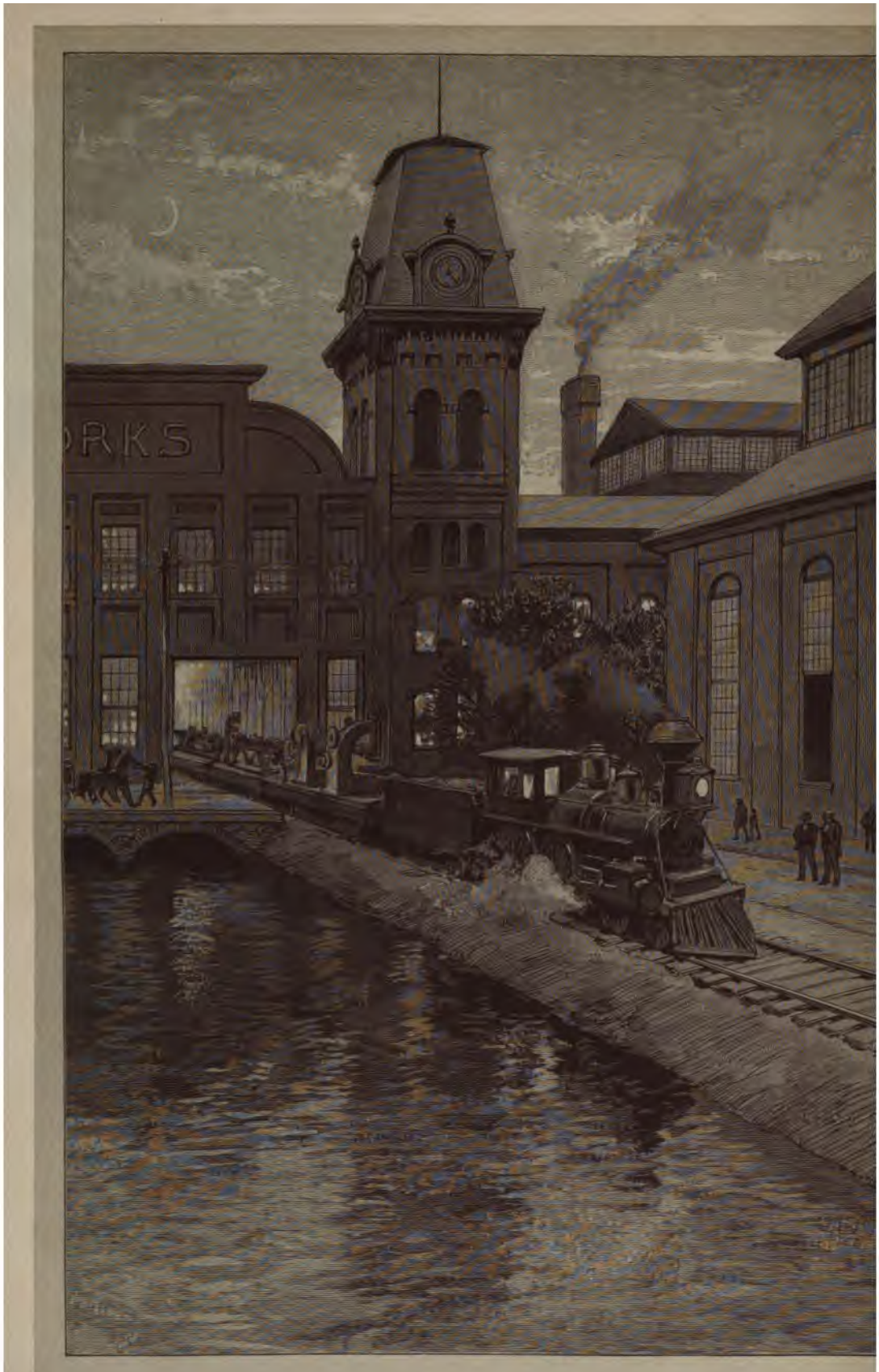
IN issuing this Catalogue, we have endeavored to present such of our machines as are of general use, and concerning which we are in most frequent receipt of letters of inquiry. We have necessarily omitted many machines as being entirely too special to be of general interest, although

VIEW IN MAIN ERECTING SHOP.

many of these even are adapted from some of our regular patterns. Estimates and photographs of special tools will be cheerfully furnished upon application.

We desire also to call your attention briefly to our very superior facilities for manufacturing machine tools.

We are prepared to furnish complete equipments for railroad, car, locomotive, boiler and machine shops. We have many special labor-saving machines for various purposes which should find a place in every shop. Our machines are fully abreast of the times, if not in advance, in convenience,



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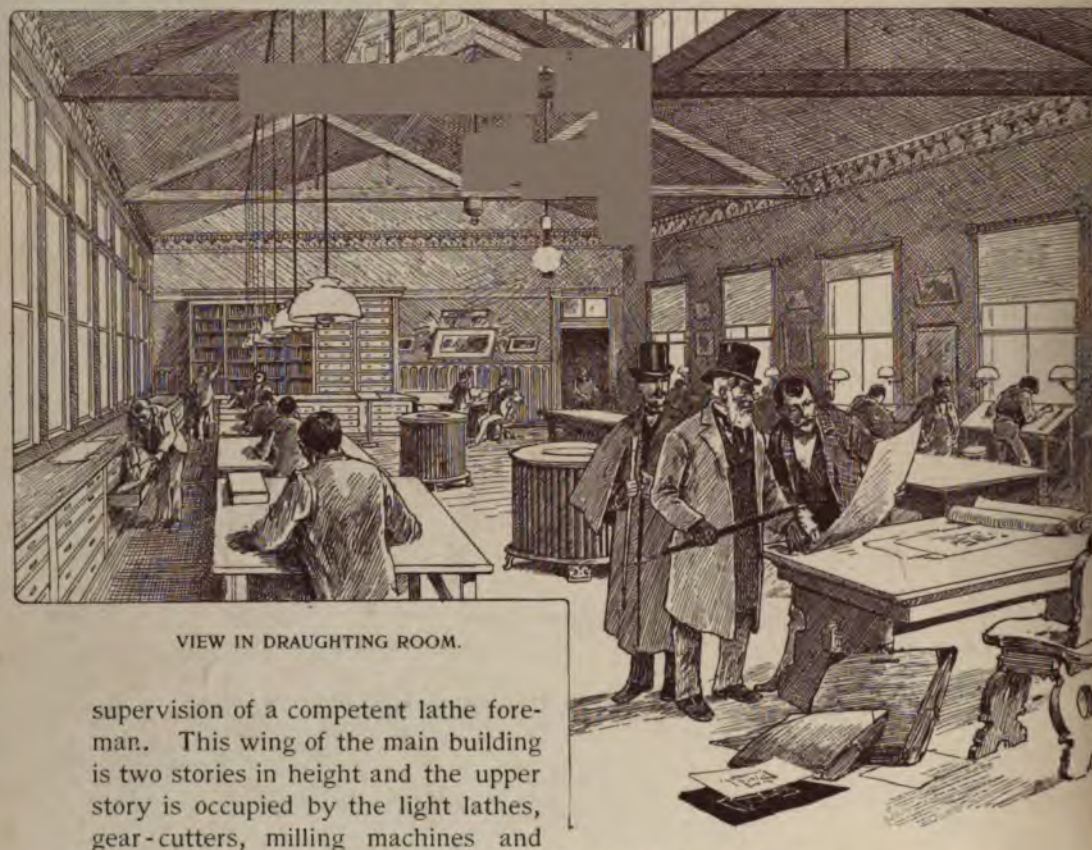
power and weight. We aim to meet all requirements, and are working constantly in the line of improvement and new labor-saving machinery for special purposes.

Our facilities for manufacture are unexcelled. We have added largely to our buildings and plant, and have now, unquestionably, the largest shops in this country devoted exclusively to the manufacture of machine tools.

Our main machine room is 400 feet long by 216 wide, in five divisions. On one side is the lathe room, which is 50 feet wide, and fitted up with overhead traveling cranes. Here all lathe work is performed under the direct



VIEW IN DRAUGHTING ROOM.

supervision of a competent lathe foreman. This wing of the main building is two stories in height and the upper story is occupied by the light lathes, gear-cutters, milling machines and screw machines which do not require to be on foundations.

The next section is the main erecting shop. It is 50 feet wide and 32 feet high under the trusses. It is fitted with pits and foundations suitable for the erection of heavy machinery. Two overhead power traveling cranes, each of 25 tons capacity, span this section, thus equipping it for the handling of the heaviest work. It is also traversed its entire length by a railroad track, which enables us to load heavy machines on cars direct by means of the traveling cranes.

The third section, 40 feet wide, is the fitting shop. In it are the vises, scraping benches, surface plates, and all tools and appliances peculiar to this department. This room is also supplied with overhead traveling cranes of 3 to 10 tons capacity. Part of this shop is occupied by the tool room, which

is thoroughly equipped with the most modern machinery for making and repairing tools. It is furnished with standard gauges and templets and a very full assortment of tools.

The next section is 36 feet wide and also 32 feet high under the trusses. It has also an overhead power traveling crane of 20 tons capacity, which is required to serve the large tools with which this room is furnished. Here are located the Heavy Planers, Boring Mills, and Horizontal Boring and Milling Machines, Radial Drills, etc., which are arranged to machine heavy castings to the best advantage.

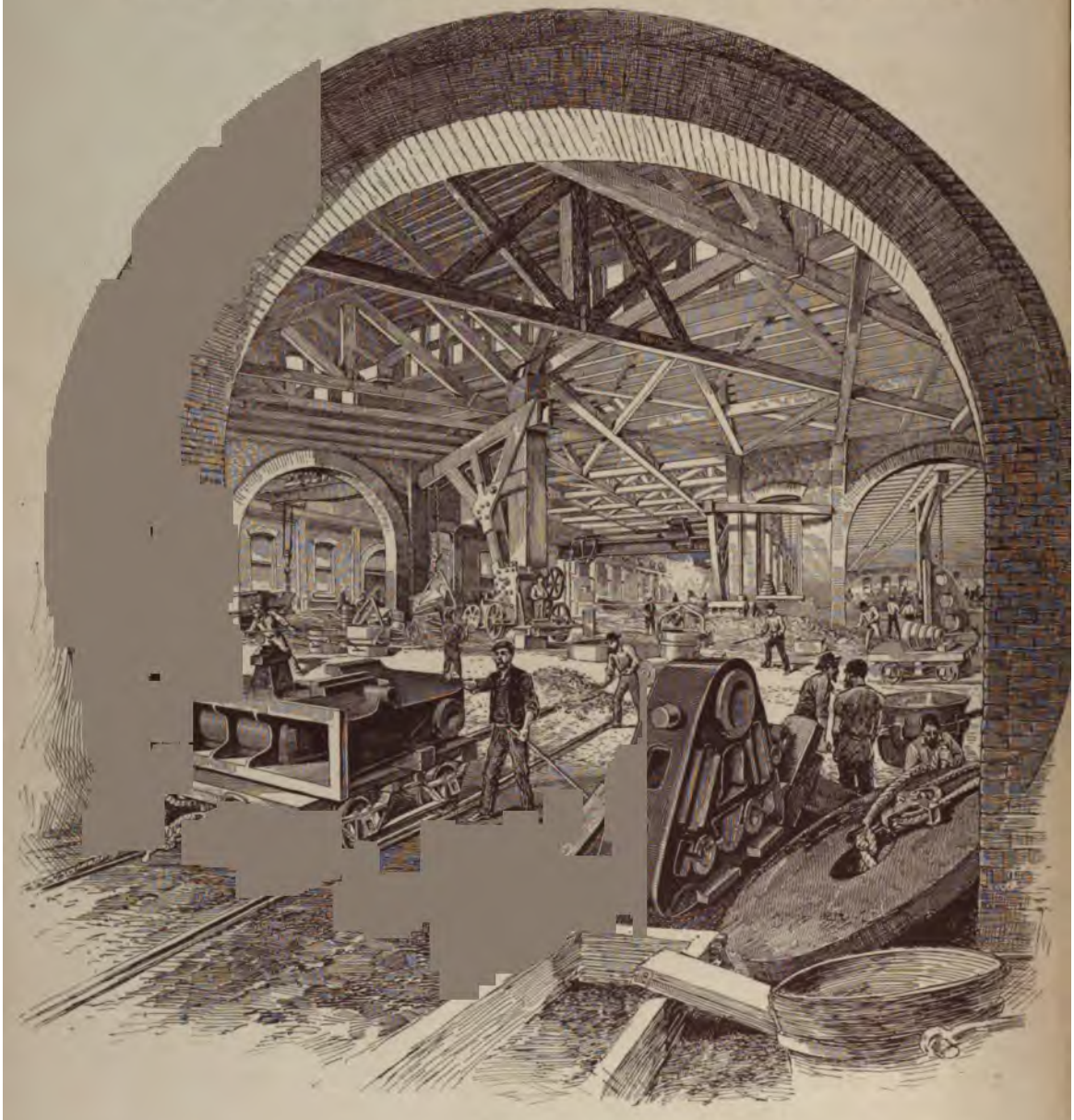
The last section is the planer room proper, 40 feet wide, which is filled with Planers, Shapers and Slotters, all conveniently arranged, and is well supplied

PRIVATE OFFICE.

with small overhead traveling cranes. All these sections are crossed by railroad tracks leading from the foundry and other shops.

In addition to this well arranged system of shops, we have also two others; one, 340 feet long by 45 feet wide; the other, 200 feet long by 48 feet wide, both thoroughly equipped with tools and tool rooms adapted to the fitting and erection of our smaller machinery. Both are supplied with overhead traveling cranes of from 3 to 6 tons capacity, and are connected with the main system by railroad tracks.

The front building is 375 feet long by 44 feet wide, and two stories high. The first floor is devoted to the offices and store rooms. The second story contains a large and elegantly fitted drawing room, 56 feet by 44 feet, lighted

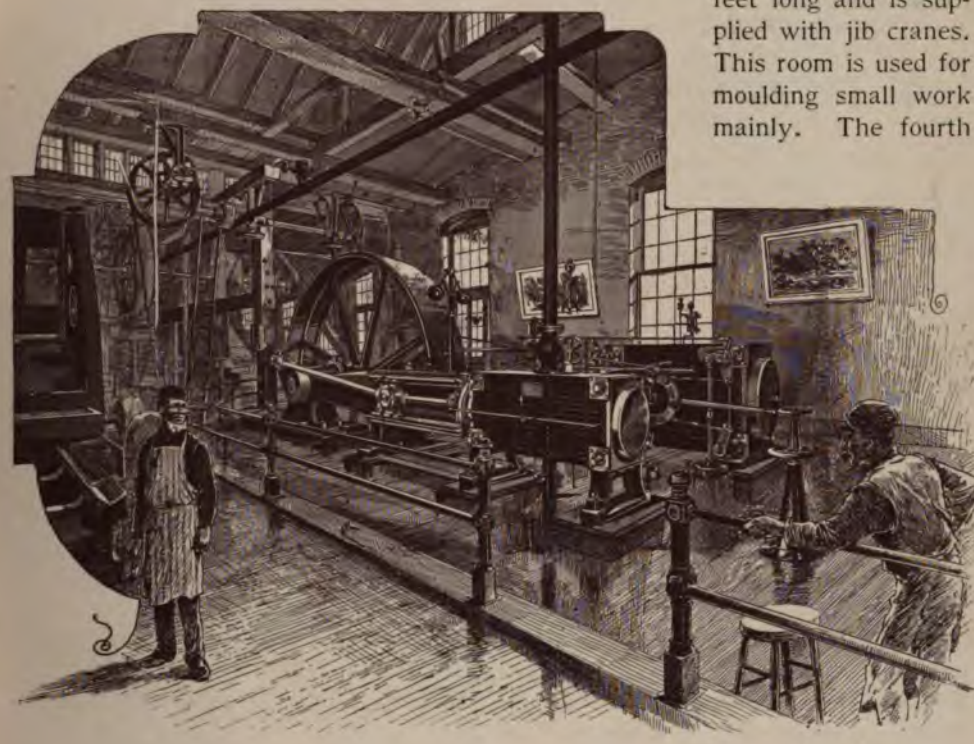


VIEW IN FOUNDRY.

from the roof, with vault and store room for drawings, blue printing and dark rooms, all connected, private offices, and a room 296 feet long by 44 feet in width, which is occupied by the pattern shop.

A large fire-proof building on the opposite side of the street, entirely isolated, is used for the storage of patterns. This building is 160 feet long and 72 feet wide, divided into three compartments by fire walls. It is arranged with two galleries and is lighted wholly from the roof. This is one of the most complete and safe pattern storage rooms in the world.

The foundry consists of four sections. Three of these are arranged side by side, with the fourth at right angles to and adjoining. The first section is 300 feet long, and is supplied with two overhead power traveling cranes, each of 20 tons capacity. The adjoining section is 140 feet long, and it has also two overhead power traveling cranes of 15 tons capacity each. The third section is 140 feet long and is supplied with jib cranes. This room is used for moulding small work mainly. The fourth



ENGINE ROOM.

section, at right angles to the others, is 170 feet long by 60 feet wide, and is furnished with four jib cranes of 20 tons capacity, all driven by power. These wings are used for moulding floors exclusively. Other rooms adjoining and connected are used for core making, cleaning castings, and the cupolas, all connected by railways and furnished with cranes for convenience in handling heavy work.

The blacksmith shop is 120 feet long by 55 feet wide, and is provided with cranes, power hammers, case hardening furnace, bolt heading machines, and every appliance to make the equipment complete.

Our shops are equipped with the best machinery and appliances for producing accurate work at lowest cost. The buildings are thoroughly well

lighted, enabling men to work to the best advantage. At night the shops are lighted by an electric light plant with 160 arc lights and gas. They are heated by steam and hot-blast air apparatus. Altogether, the works occupy about fifteen acres, over eight of which are under roof.

Our facilities for shipping are unexcelled. Cars can be loaded directly under our powerful traveling cranes and promptly delivered to any of the railroads. Hamilton is a junction point and has first-class railroad facilities for shipment to all parts of the country.

BRANCH HOUSES.

For the convenience of our trade we have established branch houses as follows:

NEW YORK, NOS. 136 AND 138 LIBERTY STREET.
PHILADELPHIA, NO. 705 ARCH STREET.
PITTSBURGH, LEWIS BLOCK.
CHICAGO, PHENIX BUILDING.

These branches are in charge of first-class men, skilled in their business, and fully prepared to give full information as to the construction and advantages of our machinery, prices, etc.

Our New York office and warerooms are illustrated herewith. We have here the finest and most complete machinery house in the world. Located on the corner of Liberty and Washington streets, extending through to Cedar street, it is elegantly lighted on three fronts. Machinery is brought in at the rear on Cedar street, and handled by a traveling crane extending through the store room. We shall endeavor to keep a line of our tools on exhibition in these rooms, and an inspection of same is solicited.

At these branch houses a full line of machinery, including our own very extensive line — Morgan Overhead Power Cranes, Steam Hammers, Hydraulic Machinery, Long & Alstatter Power Punching and Shearing Machinery, and iron working machinery of every description is handled, and they are prepared to furnish estimates on complete equipments of machinery.

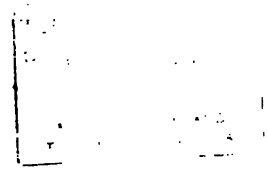
With these superior facilities, which enable us to give better service than ever before, we shall aim, by the maintenance of a high order of workmanship, and constant improvement in our patterns, to merit a continuance of the liberal patronage we have hitherto enjoyed.

Respectfully,

NILES TOOL WORKS.

ALEXANDER GORDON, President.
ROBT. C. MCKINNEY, Sec'y and Treas.

NILES TOOL WORKS BUILDING.
Liberty, Washington and Cedar Streets, New York City.



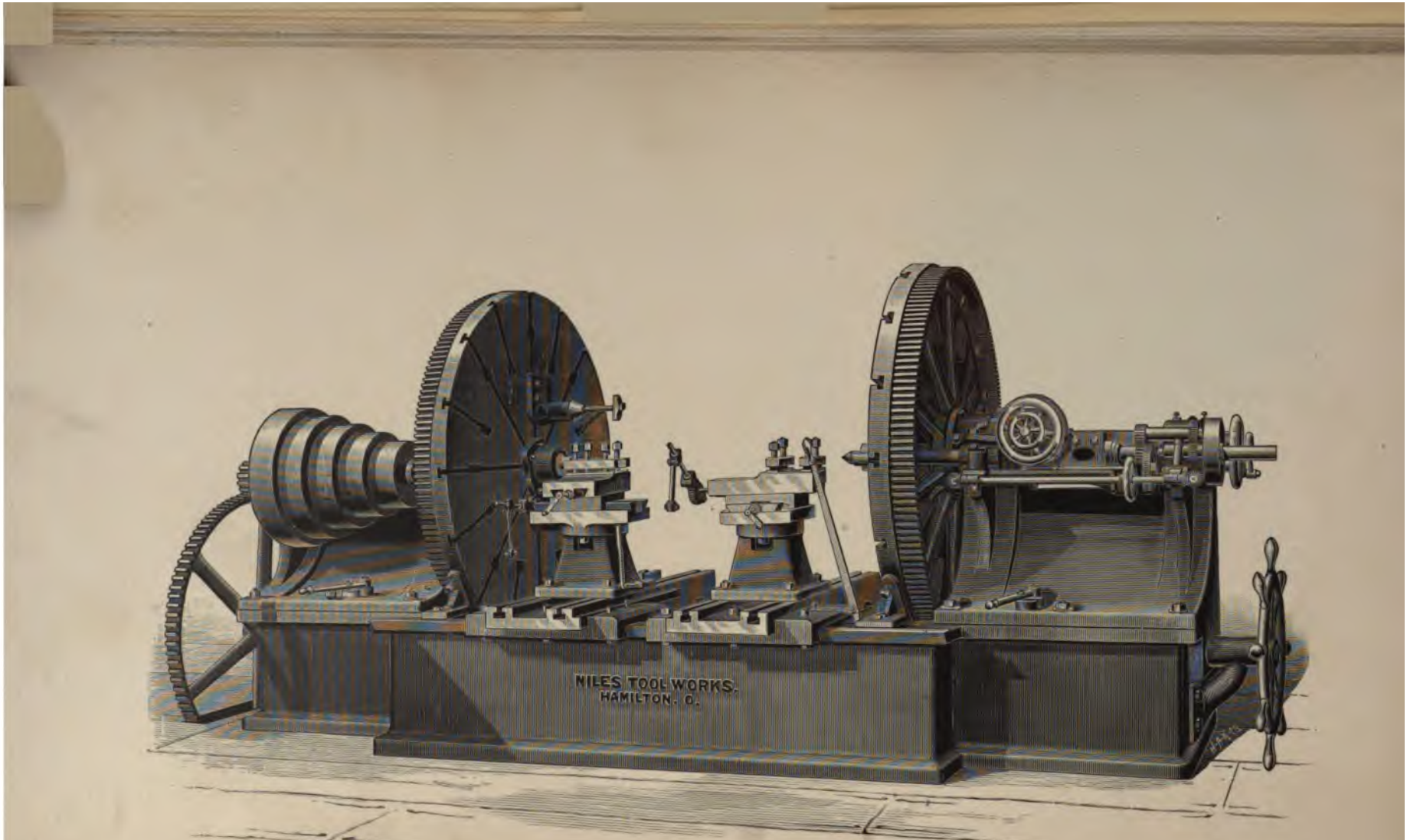
PART I.

RAILROAD MACHINERY,

FOR WHEELS AND AXLES.

NILES TOOL WORKS,

HAMILTON, OHIO.



DRIVING WHEEL LATHE, WITH QUARTERING ATTACHMENT.

PART I.

Driving Wheel Lathes.

THESE Lathes all have two heads, face plates and carriages for turning a pair of drivers on their axles at the same time. They have ample power to carry two heavy cuts simultaneously.

The face plates may be driven together or separately, as desired, and at the same or different speeds. They are made of sufficient diameter to afford clamping room for tires, to allow for boring.

The main spindles are of extra large diameter, with large and long bearings. Each main spindle has an internal sliding spindle with sufficient traverse to clear the longest crank pins.

The driving shaft is a solid steel forging, extra large, free from torsion, and hence insuring great steadiness of motion while the Lathe is taking heavy cuts.

All gearing, including the large face plate gear, is cut from the solid, insuring the full bearing of the teeth, and smooth, steady running of the Lathe.

The face plate gears are not cast solid with the face plates, but are securely bolted to them, and may, in case of accident, be readily replaced without the necessity of replacing also the face plates.

The bed is triple web, of great width and depth. The front section forming the slides for the carriages is carried up to secure great stiffness at the point where the strain of the cut is taken, and to permit the use of very short, stiff tool rests.

The feeds are automatic, and arranged by a special device to secure proper speeds for turning both tires and journals.

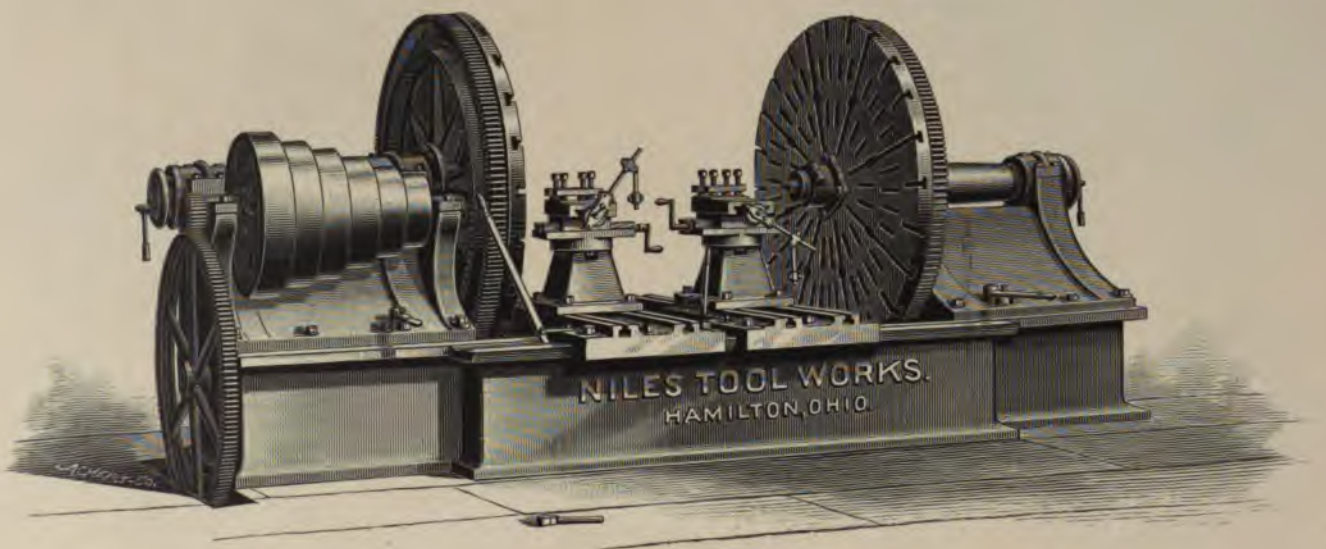
The right-hand head is arranged to slide, to accommodate axles of different length. It is operated by powerful hand gearing.

QUARTERING ATTACHMENT.

Our Driving Wheel Lathes may be furnished with Quartering and Crank Pin Boring Attachments on one or both heads, as may be desired.

These attachments are secured to heavy brackets cast on the sides of the head stocks. They are arranged for quartering either right or left-hand lead, as ordered.

The boring spindle is of large diameter. A bearing is provided to attach to the front of the face plate to support the end of the spindle, close up to the work. Brackets are also furnished to clamp the face plates in position when quartering.



DRIVING WHEEL LATHE, WITHOUT QUARTERING ATTACHMENT.

Driving Wheel Lathes.

LIST OF SIZES.

60-Inch Driving Wheel Lathe.

Swings 61 inches diameter.
Diameter of Face Plates, 60 inches.
Will turn wheels 54 inches on tread.

66-Inch Driving Wheel Lathe.

Swings 67 inches diameter.
Diameter of Face Plates, 66 inches.
Will turn wheels 60 inches on tread.

69-Inch Driving Wheel Lathe.

Swings 70 inches diameter.
Diameter of Face Plates, 69 inches.
Will turn wheels 66 inches on tread.

79-Inch Driving Wheel Lathe.

Swings 79 inches diameter.
Diameter of Face Plates, 78 inches.
Will turn wheels 72 inches on tread.

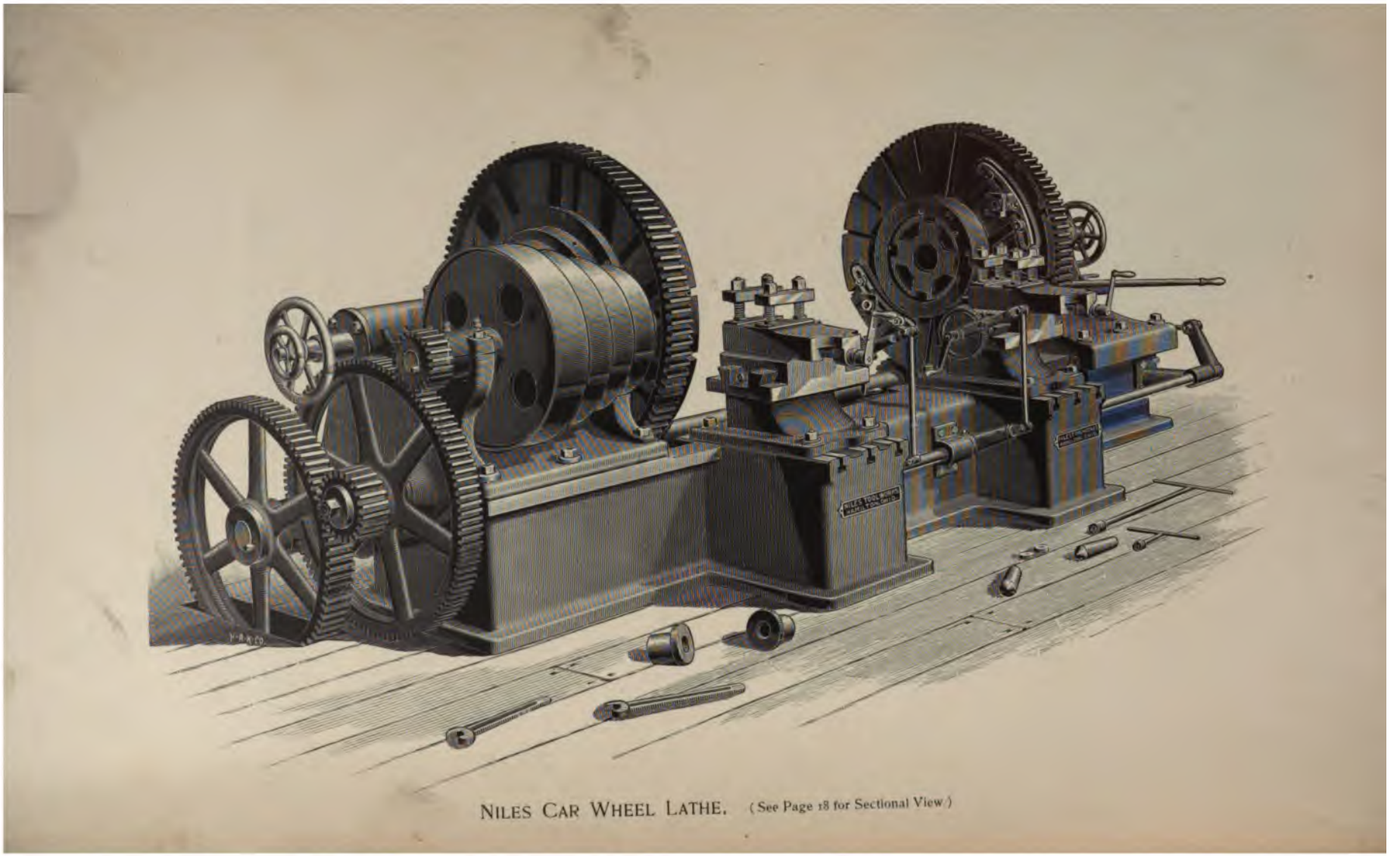
84-Inch Wheel Lathe.

Swings 85 inches diameter.
Diameter of Face Plates, 84 inches.
Will turn wheels 78 inches on tread.

90-Inch Driving Wheel Lathe.

Swings 91 inches diameter.
Diameter of Face Plates, 90 inches.
Will turn wheels 84 inches on tread.

Any of these Lathes may be furnished without Quartering Attachment, with Single Quartering Attachment or with Double Quartering Attachment.



NILES CAR WHEEL LATHE. (See Page 18 for Sectional View.)

Niles Car Wheel Lathe.

FOR TURNING STEEL TIRED WHEELS.

(Patented January 19, 1886, January 26, 1886, June 29, 1886, and April 19, 1887.)

Swings 48 Inches, and will Turn Wheels from 33 Inches to 42 Inches Diameter.

THIS Lathe is specially designed for turning steel tired car and truck wheels on their axles. The ordinary Driving Wheel Lathe is not adapted for this work as in that case the axles must be supported by their centers. This is not practicable, since in service neither the journals or wheel fits of car axles remain true with the axle center. The problem presented in this case is to grip the axles by their journals, keep them in line with each other and revolve them about their common centers, whether these should be true with the original centers of the axle or not.

This is accomplished in the following manner: The Lathe is arranged with two face plates revolving on hubs projecting from each head, turned very true and placed in exact alignment. Within these face plates and revolving with them, are placed two very strong, self-centering chucks, with four swivel jaws. They are operated by gearing mounted on each head block. These grip the axle very firmly about the centers of the journals, and with the face plates revolve them in exact line.

The two face plates are geared together in the same manner as on Driving Wheel Lathes by a heavy forged steel shaft. The driving cone has four steps for a five-inch belt. The gearing is enormously strong, and all cut from the solid.

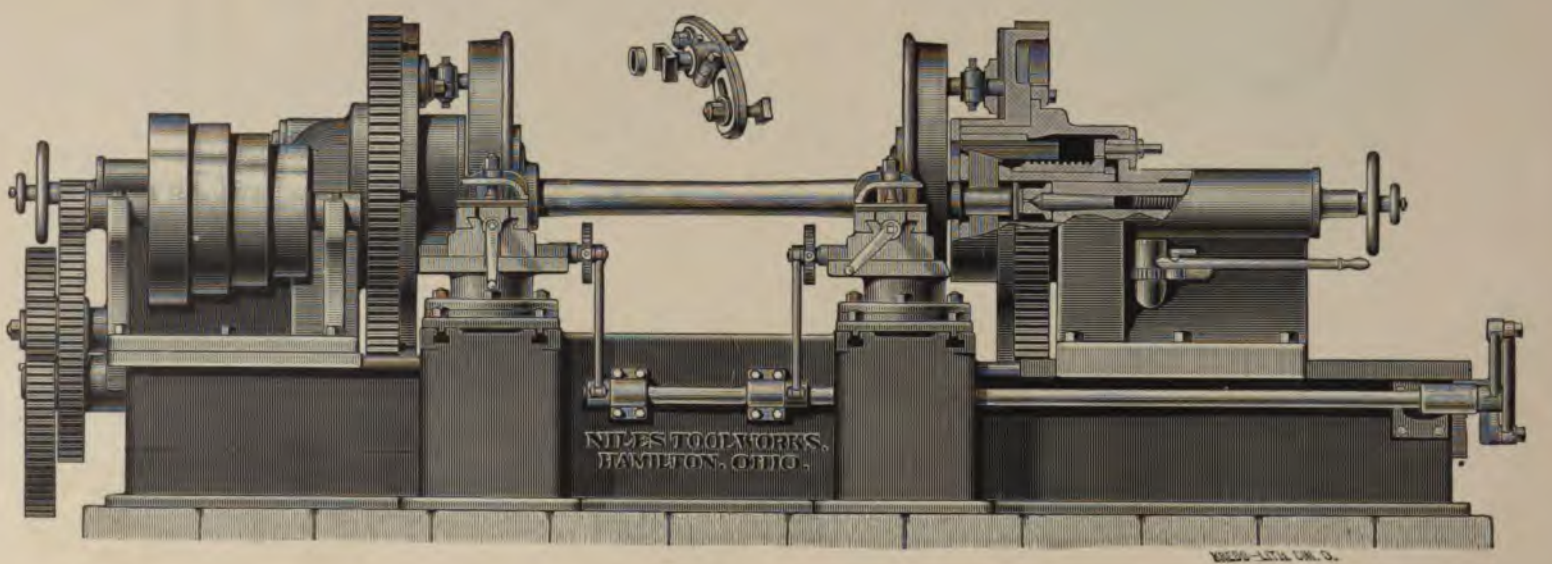
The chucks above mentioned are used only to center the work and insure the wheels being turned true with the journals. The wheels are revolved by two drivers on each face plate, which engage with the heads of the bolts used to secure the tire to the wheel center. These drivers are adjustable both lengthwise and radially to suit any wheel.

Each head is arranged with a sliding spindle, with centers, which are capped to prevent end motion of the axle when used for turning truck wheels with inside journals. These caps can be removed and the spindles run out beyond the face plates, when the work may be carried on the centers.

The right-hand head is movable on the bed by rack and pinion. As the chucks have swivel jaws, they will accommodate themselves to the work as it is put into the lathe.

The feeds are operated from the driving shaft by means of a rock shaft placed in front of the machine, and work through the means of a ratchet lever in the same manner as on Driving Wheel Lathes.

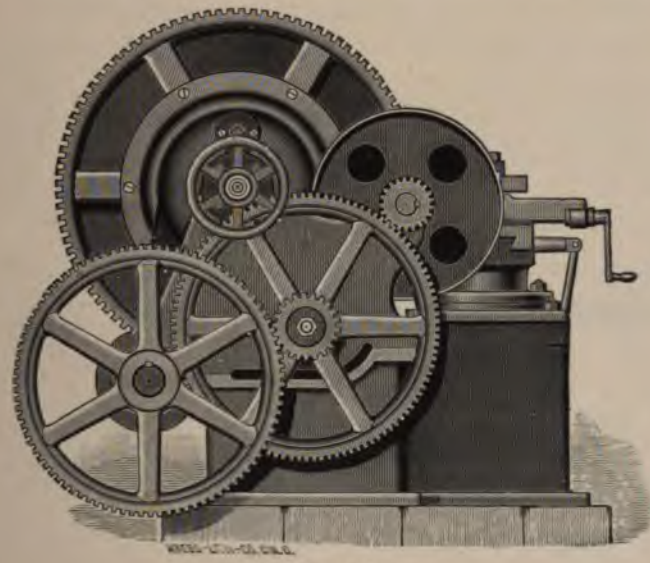
The front section of the bed is raised, as in the case of Driving Wheel Lathes, and the tool rests are then made short and very stiff. They are adjustable for turning the taper on the tread of the wheel.



NILES CAR WHEEL LATHE—SECTIONAL VIEW.

Car Wheel Lathe.—Continued.

THE cut on the opposite page illustrates the novel features of this Lathe. The right-hand head is shown in section, showing the method of gripping the axles on their journals, and the sliding spindle with center, which is capped to take the end thrust of the axle. It also shows clearly the novel dog used for driving. This dog is adjustable in both directions and is easily and quickly set to the work. A circular washer surrounds the bolt head, which is then held in the square socket on the driver. The driver is thus made as short as possible to give rigidity. The journal boxes, as shown, are virtually heavy, four-jawed



END VIEW OF LATHE.

chucks, whose jaws may be opened and closed while the Lathe is running, from the rear of the face plates. The chuck jaws have two pads, forming an adjustable journal box, which can be adjusted with any desired degree of snugness to any axle journal.

The machine permits of the heaviest possible cuts being taken, and insures that the turned car wheel shall be true with the axle journals. The accuracy secured by this system of operations is inherent in the mechanism, and is not dependent upon the skill with which a workman sets a chuck. This accuracy is not attainable by any other system.

These Lathes are in successful operation in many of the leading Railroad and Car Shops, and their capacity for work is unequaled.

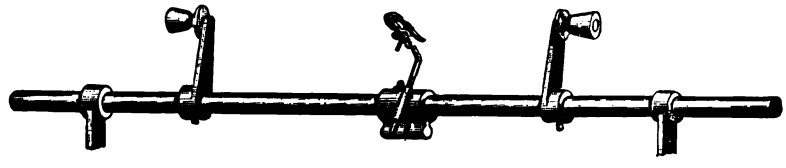
Calipering Device.

FOR NILES CAR WHEEL LATHE.

IN turning car wheels it is essential for good work that the two wheels of a pair should be of equal diameter, and economy forbids the taking of any extra cuts over either wheel in order to secure uniform diameter. Furthermore, as both wheels are turned at one time, the size to which the smallest wheel will finish must be determined before the turning really begins.

It takes two men to accurately handle the large calipers necessary in car wheel work, and much time is lost in the operation; and, as a general thing, the calipering is done in a very slovenly and inaccurate manner.

In the present machine a true bar is supported, parallel with the axis of the Lathe, in standards upon the two head stocks. This bar slides freely in its standards, and upon it slides a light, adjustable spring Caliper. By means of this Caliper the smaller wheel can be easily picked out, and then the Caliper can be



set to a size at which the smaller wheel will finish. The Caliper can then be slid from one wheel to the other and both cuts be quickly gotten under way. The sliding Caliper is so counterbalanced as naturally to swing upward out of contact with the wheels, but it can easily, at any time, be swept around to bring the point of the Caliper into contact with the work.

The bar also carries two arms provided with contour rollers which serve in securing the proper gauge for the wheels and in testing the contour of the flange work.

The rollers do not serve in any manner as Calipers, but simply lie upon the wheels and enable the lathesman to judge at once of where the cutting is to be done. The Caliper slides upon the bar between the arms which carry the rollers, and the free end-shifting of the bar, together with the sliding of the Caliper upon the bar, enables the Caliper to be freely moved from one wheel to the other.

The bar, with its Caliper and gauges, is arranged well up and free of the wheels where it does not interfere with the view of the turning tools, and where it does not interfere with the placing of the wheels in and out of the Lathe.

Double Cutting-Off and Centering Machine.

FOR LOCOMOTIVE AND CAR AXLES.

WILL cut off and center axles up to 9 inches diameter, and up to 7 feet 6 inches in length, cutting off both ends at one time.

The machine consists essentially of two strong heads mounted on a heavy, stiff bed, along which they are adjustable to suit varying lengths of axles.

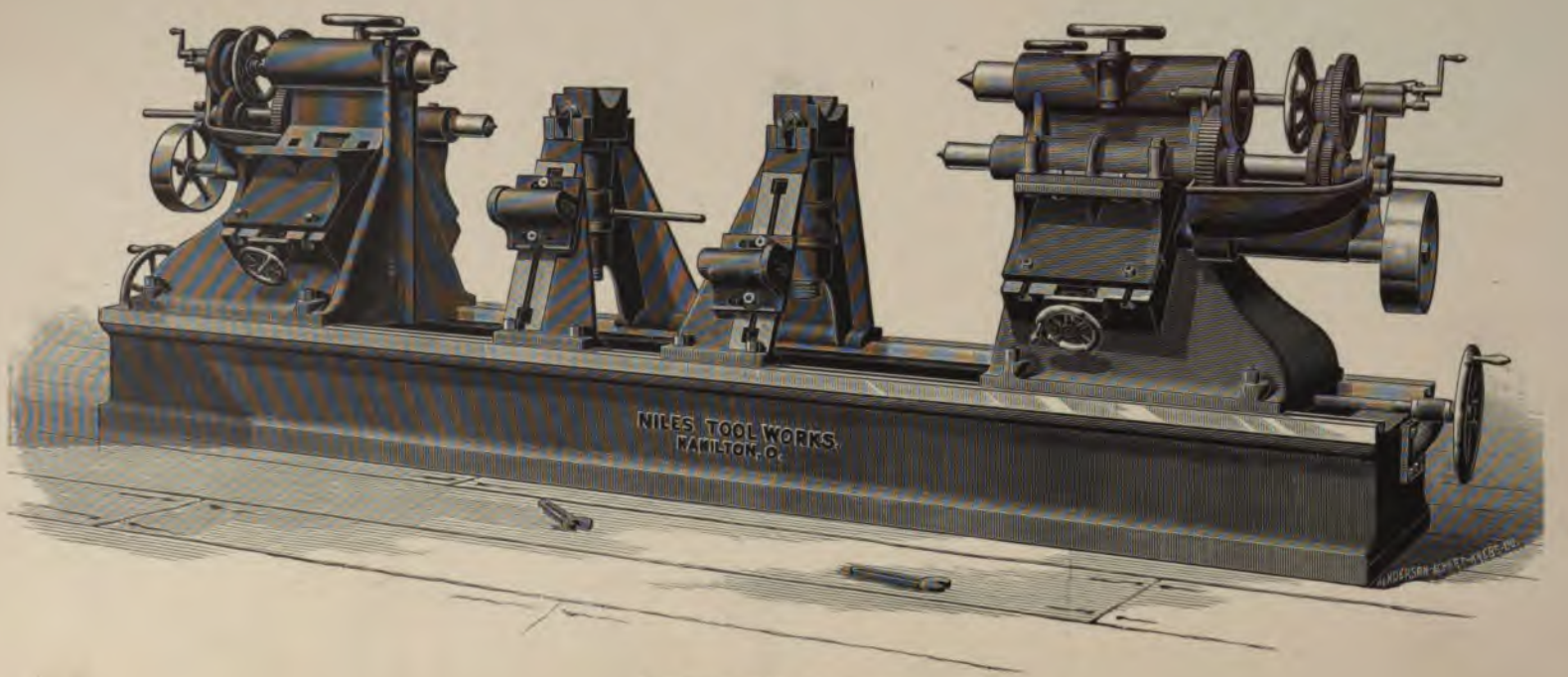
Within these heads are strong chucks which grip the axles firmly. These are driven by spur gear and pinion from below, by a shaft running the whole length of the bed. At each end of the bed are placed the carriages on which are mounted the cutting off slide and centering spindles. These carriages are also adjustable on the bed to suit lengths required.

The driving cone has four changes for a 4-inch belt.

The countershaft has a double set of pulleys giving eight changes of speed, so arranged that the speed can be changed instantly as the cutting off tool approaches the center.

The tool slides have power feed with three changes. The center drills are driven independently. The drill heads are arranged to slide back to give clearance when putting in axles.

There are countershaft pulleys 20 inches diameter, 8½ inches face, for 4-inch belt, which should run 250 and 325 revolutions per minute.



QUARTERING MACHINE.

Quartering Machine.

FOR QUARTERING AND BORING CRANK PIN HOLES OF LOCOMOTIVE DRIVING WHEELS.

WILL quarter wheels ranging from 45 inches to 72 inches diameter, and for cranks ranging from 16 inches to 26 inches throw.

Both crank pin holes are bored at the same time. The spindles are operated from the outside of the wheels and are driven separately. Each spindle has automatic feed, operated by gearing, with three changes.

The wheels are centered by the spindles, but not supported by them. They are supported on their axles by substantial steady rests, adjustable for height, and are also secured on the tread.

The spindles may be located on either side of the head stocks, adapting the machine for either right or left-handed lead.

The machine can be provided with a device for trueing up crank pins in place, when so desired.

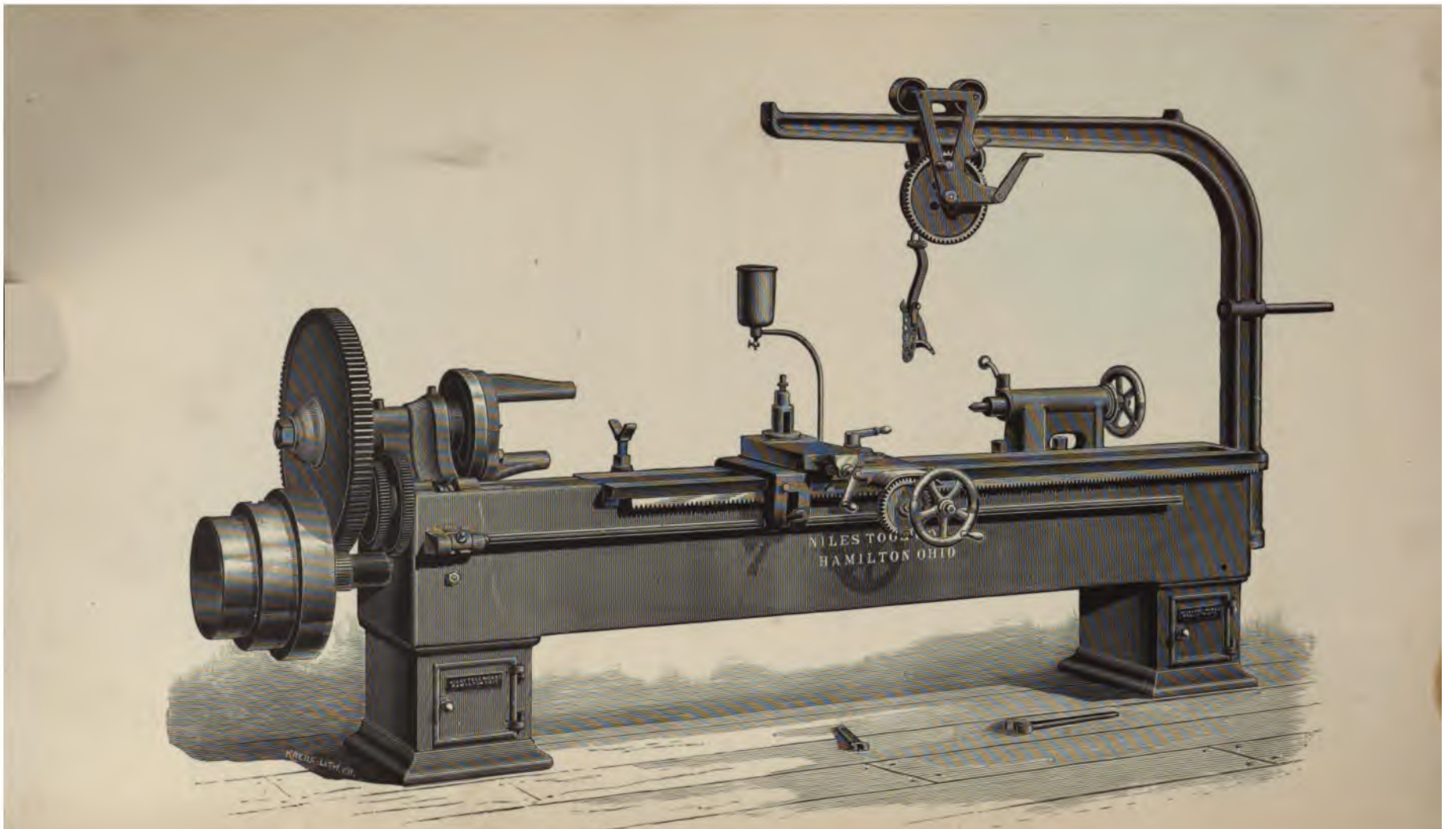
The spindles are driven by belt from overhead countershaft.

The countershaft has three pulleys 24 inches diameter, for a 3-inch belt.

Speeds of countershaft, 90 and 120 revolutions per minute.

A good many railroad shops do all quartering by means of the attachment furnished for that purpose with wheel lathes, but when a large number of engines are to be kept in repair these lathes are kept so constantly employed in boring and turning tires that the use of another machine to do quartering becomes necessary, and this machine has been designed for that purpose.

It is adapted to be applicable to all the sizes of driving wheels now in common use. The driving axles are securely held in very stiff, adjustable yokes, and are centered by spindles in the head blocks. The wheels are also securely clamped on the tread. Both head blocks are adjustable on the bed, to accommodate the various lengths of driving axles in use. The boring spindles are placed on brackets on the side of the head blocks. Each head block has two of these brackets placed exactly at right angles to each other, thus allowing wheels to be quartered either right or left-hand lead, as desired. The boring spindles operate from the outside of the wheels, and are entirely independent of each other, so that the stopping of one does not interfere with the other. Three changes of feed are provided—two for roughing and one for finishing. The machine is made in very stiff form, to insure steadiness and accuracy.



SINGLE AXLE LATHE.

Single Axle Lathe.

FOR TURNING CAR AND LOCOMOTIVE AXLES.

DRIVING CONE has three steps for 3½-inch belt, and is strongly geared. Two changes of feed, suitable for roughing and finishing, are provided. The change from roughing to finishing is made instantly, and without the necessity of the operator changing his position.

The face plate carries a self-adjusting driver.

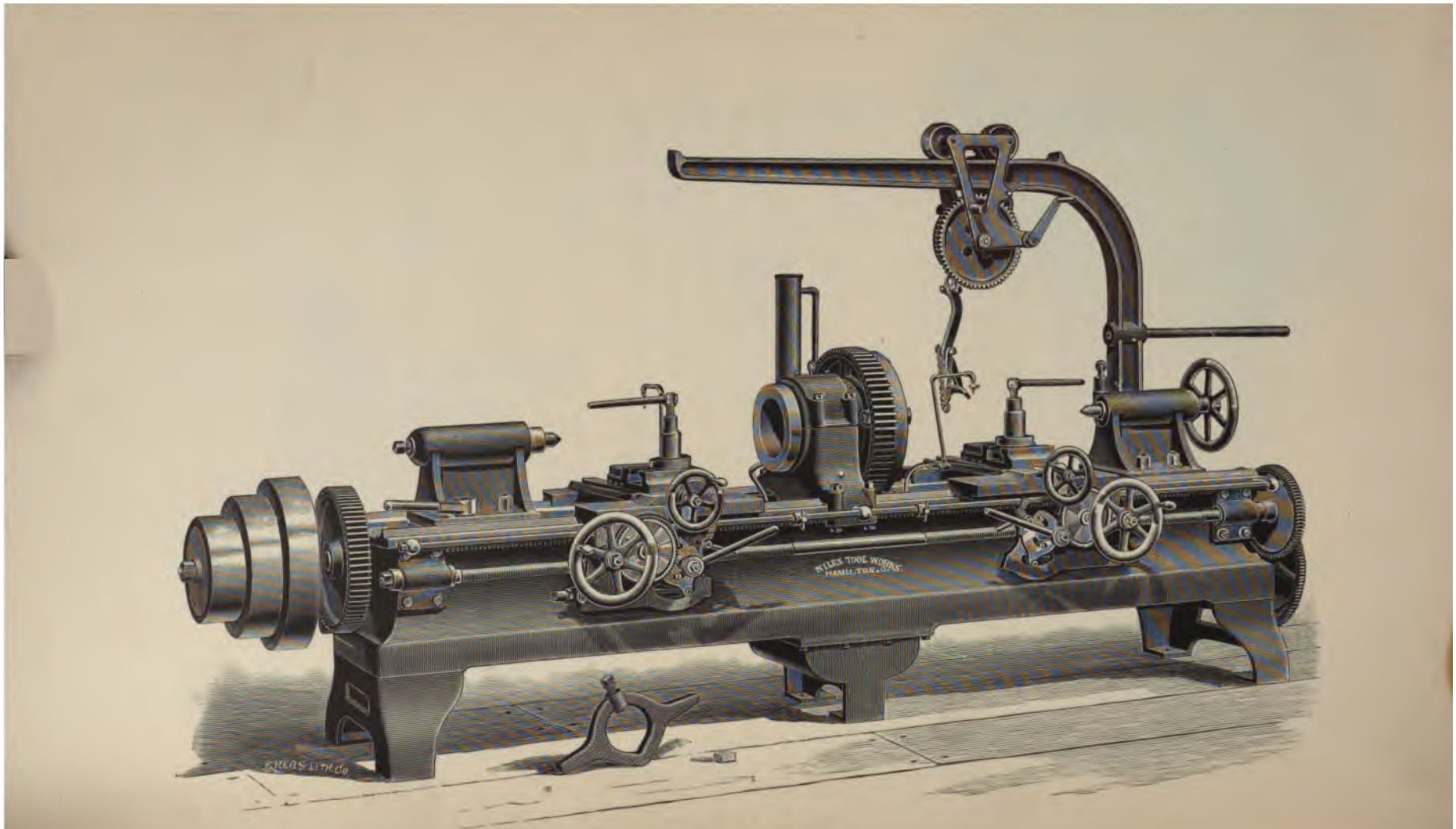
The front section of the bed is of extra depth, as in the Driving Wheel Lathes, giving additional strength at the point of cut.

We build this machine mainly for the accommodation of smaller roads and repair shops having but little of this work to do, and we recommend its use in such places only. For shops having a large quantity of this work the Double Axle Lathe is preferred in point of economy. The Double Axle Lathe will do nearly double the amount of work at the same outlay for labor and expense.

The countershaft is arranged with three pulleys having two speeds, hence giving six changes of speed to the Lathe.

The countershaft pulleys are 20 inches diameter, 8 inches face. Speeds, 90 and 120 revolutions.

NOTE.—These machines are furnished either with or without the very convenient crane shown in cut, as desired.



DOUBLE AXLE LATHE.

Double Axle Lathe.

(Patented May 9, 1871, and Jan. 10, 1882.)

THIS machine is designed for turning Locomotive and Car Axles, and is provided with two carriages, tool posts, etc., for finishing both ends of the axle at the same time. The axle is passed through the center-head and driven by an equalizing driver, turning upon two dead centers. The axle is finished complete at one operation, without turning end for end.

The driving cone has three steps for a 4-inch belt, and is very strongly geared.

Carriages are fed by steel screw with right and left-hand threads. The feeds are driven positively by gearing, and two changes of feed for roughing and finishing are provided without changing gears. The change is made by pulling an internal clutch.

The center head is movable on the bed. This head carries an equalizing driver plate, the driving studs of which come in contact with the dog on the axle, hence the axle is not held rigidly but is permitted to accommodate itself to any irregularities in the forging. This method of driving, together with the fact that we turn on dead centers, insures the most accurate character of work. The center leg forms a tank for holding water and oil. A rotary pump driven from the main gearing forces a stream of water and oil on the cuts while the machine is in operation. The carriages and bed are so constructed as to carry the overflow back into the tank.

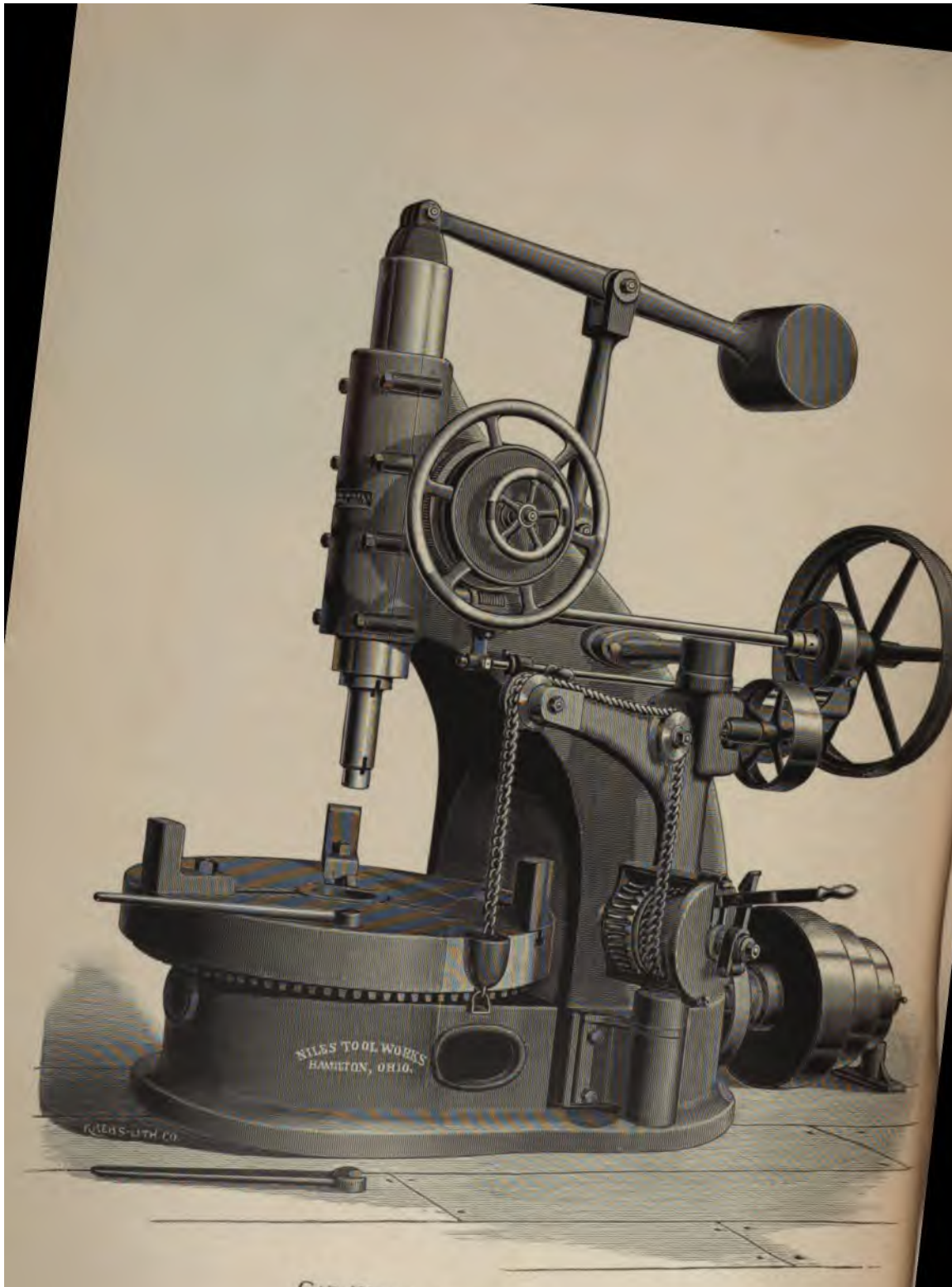
A convenient crane is provided, by means of which one man can handle the axles in and out of the Lathe.

The hole through the center head is 8¼ inches diameter, hence an axle can be put into the Lathe easily. The Lathe will take in between centers 7 feet 8 inches, accommodating the longest axle in use.

The capacity of this machine is nearly double that of the best Single Axle Lathe built. From seven to ten axles per day of ten hours is a fair average on a Single Axle Lathe. On our Double Axle Lathe from sixteen to twenty axles can be finished by an average hand as a regular day's work. We have cases where as many as twenty-five axles have been turned in one day.

This Lathe has demonstrated its value by actual service for many years in the leading railroad and car shops of this country. It is by no means an experiment. It will do the work claimed for it and fully justifies the increased investment.

The countershaft has two pulleys, 18 inches diameter, 4 inches face, and should run 160 revolutions per minute.



CAR WHEEL BORING MACHINE.

Car Wheel Boring Machine with Power Crane.

FOR BORING CAR WHEELS UP TO 42 INCHES DIAMETER.

THE chuck is 48 inches diameter, self-centering, with independent jaws.

For boring car wheels a very stiff and powerful machine is required. It is the usual practice to take two cuts in boring wheels; the first, or roughing cut, taking out most of the metal to be removed. The finishing cut is run through at a fast feed, taking out very little metal. This work is forced to the utmost capacity of the tools. It is, therefore, important that the machine should be very stiff and perfectly rigid under the heaviest cuts.

Our Car Wheel Borer is one of the heaviest machines built for this purpose. Weight, 11,500 pounds. The metal is distributed in the best manner to resist the strains to which such a machine is subjected.

The column is not square or rectangular in section, but is of such a form as to partly surround the chuck plate with a very broad base, being the stiffest form possible, and preventing any spring in the machine.

The chuck is made very strong and substantial in order to stand the very hard usage to which such a machine is subjected. The chuck-spindle is fitted to a straight bush in the body of the machine. In case of wear this bush may be replaced and the spindle refitted in any shop.

The machine is provided with power crane, by means of which wheels may be handled with the greatest ease and very rapidly. The crane beam is very low, and may swing under the tool bar, directly over the center of the chuck.

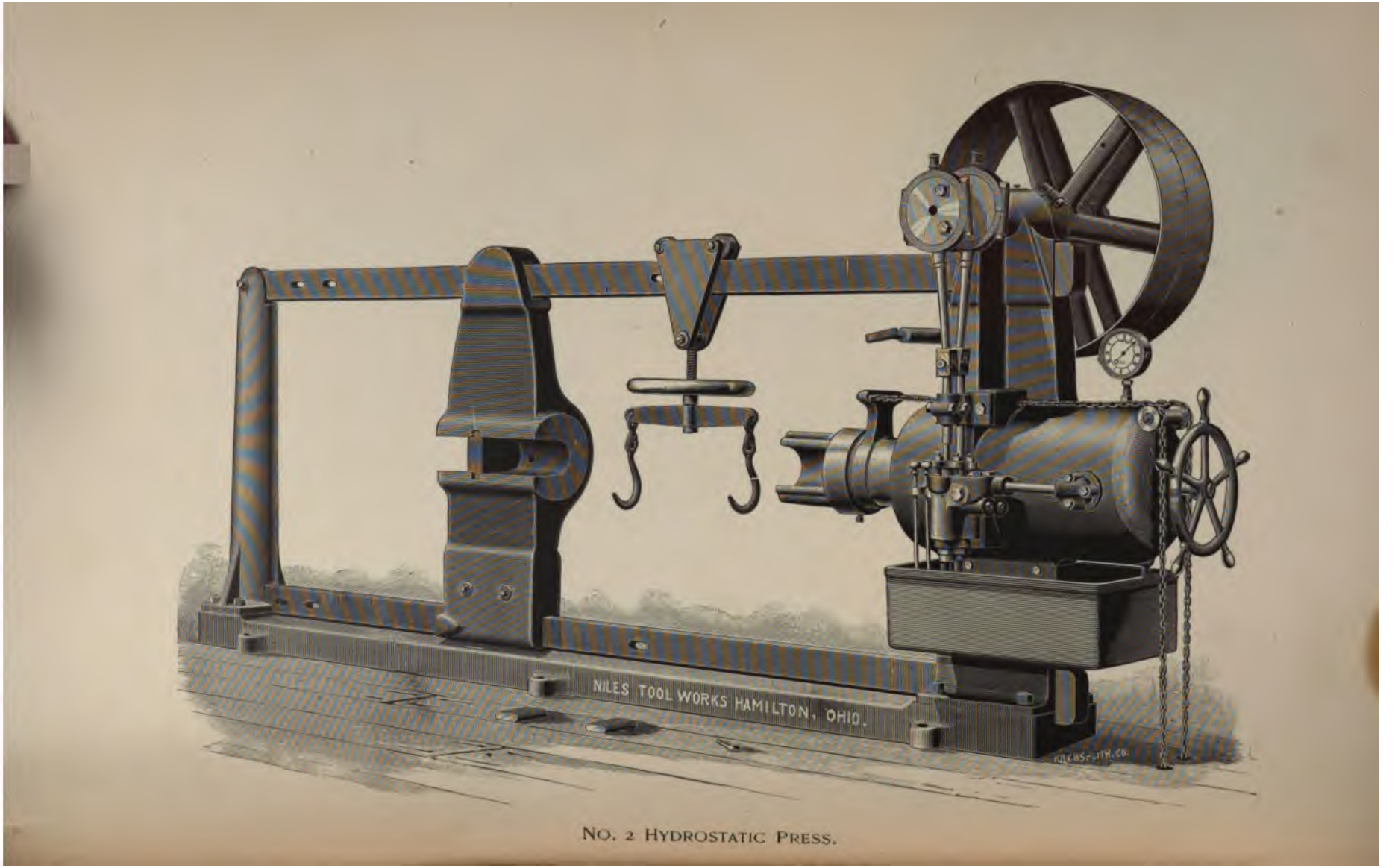
The driving cone has three steps for a five-inch belt.

There are three changes of feed — two for roughing and one for finishing — ranging from one-sixteenth to one-half inch. The change from the roughing to the finishing cut is made by the operator instantly, without changing belts or gears or moving from his place.

The boring bar is fed by a steel rack, accurately cut. It is counterweighted and has quick return.

Countershaft and wrenches are furnished with machine.

The countershaft pulleys are 30 inches diameter, 6½ inches face. Speed of countershaft, 60 revolutions per minute. Countershaft for crane has pulleys 12 inches diameter, 4½ inches face. Speed, 200 revolutions.



No. 2 Hydrostatic Press.

Hydrostatic Car and Driving Wheel Presses.

THESE machines are designed for pressing on and off car and driving wheels by hydrostatic pressure.

They are all very strongly made and will work with safety up to their stated capacity. The cylinders are all made of cold-blast iron and are lined with copper, which is very carefully spun and burnished into place to prevent leaking.

On all sizes except No. 1 the pumps have two plungers 1¾ and 1 inch diameter, respectively.

The operation of the plungers is controlled by an improved device recently brought out by us and patented. This device consists of rods and levers connected with the suction valves. By raising the levers the suction valves are seated and the plungers force water into the cylinder. At the start the combined areas of both plungers are thus utilized. When the pressure rises, the rod connected with the valve of the larger plunger is dropped, unseating the valve and stopping its operation. The smaller plunger continues its work until the wheel is forced to its position. Its rod is then dropped and the operation ceases.

The starting and stopping is done instantly, with the least possible exertion on the part of the workman, and without changing his position, and both plungers are utilized at the start to expedite the work.

The cylinders and resistance posts are held by two heavy, steel tie-bars, amply sufficient for the heaviest duty. A cast iron sole-plate supports the entire machine, making it wholly self-contained.

We furnish pressure gauge, graduated to show pounds per square inch and tons on ram; safety valve, enclosed in a case wherein it may be locked; relief valve, weight for ram, tank and wrenches.

The pressure ordinarily required for forcing wheels on their axles is about thirty tons, and when put on at that pressure they will not come off in use. For removing old wheels from their axles the pressure required may be equal to all the machine will exert.

These machines are built of following sizes and capacities.

No. 1 Hydrostatic Car Wheel Press.

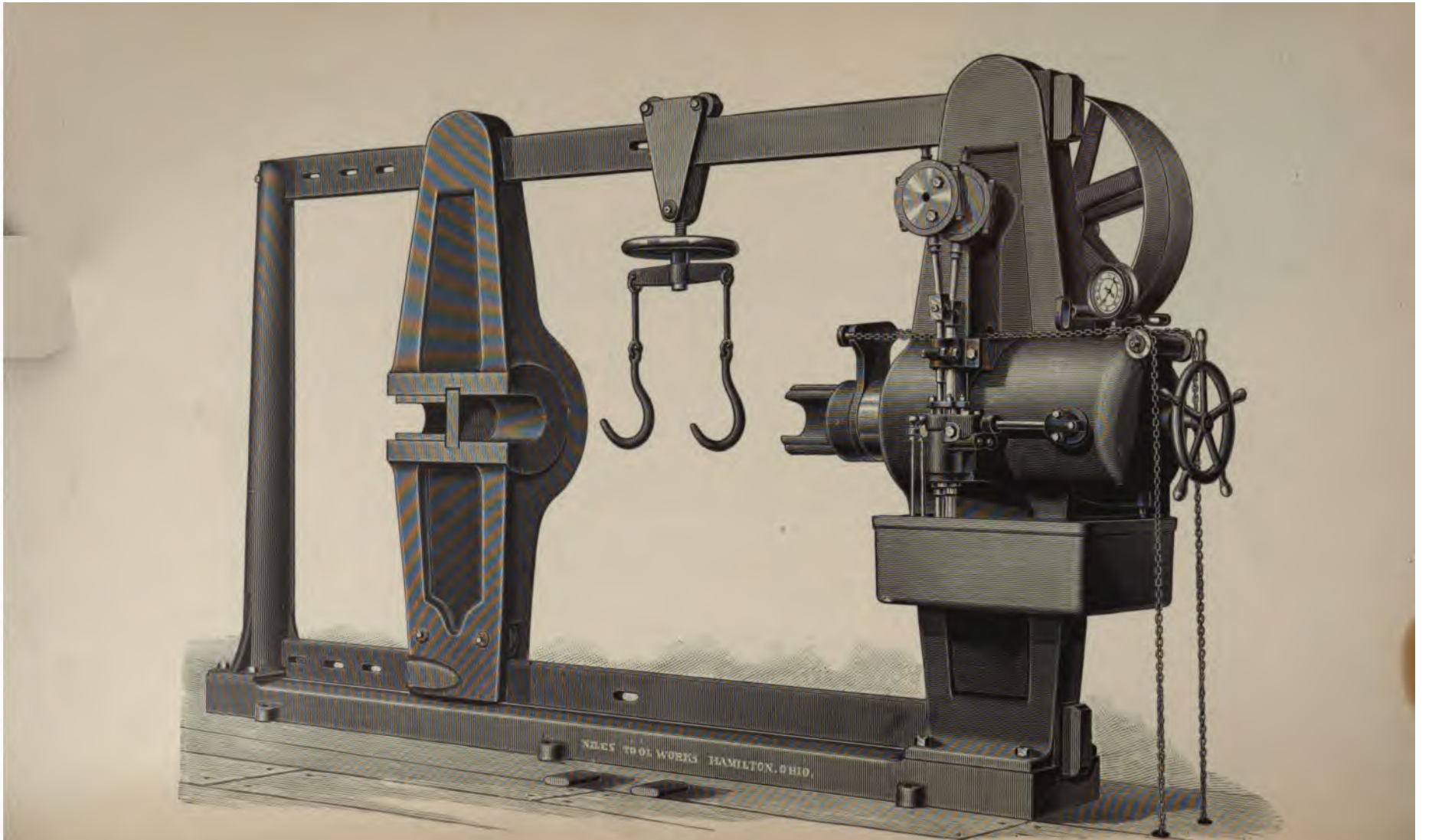
FOR PRESSING ON AND OFF CAR WHEELS.

Will take in wheels up to 36 inches diameter. Tested up to a pressure of 100 tons before leaving the works.

The ram is 8 inches diameter, and has 18 inches stroke.

The pump has a single plunger, ¾-inch diameter.

The machine has two pulleys 30 inches diameter, 4 inches face. Speed, 100 revolutions per minute.



No. 5 Hydrostatic Wheel Press. (Capacity, 500 Tons.)

Hydrostatic Car and Driving Wheel Presses.

(CONTINUED.)

No. 2 Hydrostatic Car Wheel Press.

(Patented April 29, 1873, and July 8, 1884.)

FOR PRESSING ON AND OFF CAR WHEELS.

Distance between tie bars, 48 inches. Capacity, 150 tons.

Ram, 9 inches diameter.

Pump has two plungers, 1¾ and 1 inch diameter.

The Press has tight and loose pulleys, 36 inches diameter, for 6-inch belt.

Speed, 100 revolutions per minute.

No. 3 Hydrostatic Wheel Press.

FOR PRESSING ON AND OFF LOCOMOTIVE DRIVERS AND CAR WHEELS.

Distance between tie bars, 66 inches. Capacity, 150 tons.

Ram, 9 inches diameter.

The machine has tight and loose pulleys, 36 inches diameter, for 6-inch belt.

Speed, 100 revolutions per minute.

No. 4 Hydrostatic Wheel Press.

FOR PRESSING ON AND OFF LOCOMOTIVE DRIVERS AND CAR WHEELS.

Distance between tie bars, 78 inches. Capacity, 200 tons.

Ram, 9 inches diameter.

Diameter tight and loose pulleys, 36 inches, for 6-inch belt.

Speed, 100 revolutions per minute.

No. 5 Hydrostatic Wheel Press.

FOR PRESSING ON AND OFF LOCOMOTIVE DRIVERS AND CAR WHEELS.

Machine is similar in construction to those already described, but is much heavier.

It is found that in pressing off old wheels great pressure is frequently required. This machine has, therefore, been built to withstand a pressure of 300 tons on the ram.

Distance between tie bars, 78 inches.

Ram, 11 inches diameter.

Diameter of tight and loose pulleys, 36 inches, for 6-inch belt.

Speed, 100 revolutions per minute.

TESTIMONIALS AND REFERENCES.

Following each Part in this Catalogue we propose publishing a few Testimonial Letters and References relating to the tools treated in the previous section of the book.

In this respect we have departed from the usual custom of publishing an appendix of testimonials.

REFERENCES.

Cincinnati, New Orleans and Texas Pacific R. R.
Pennsylvania R. R. Co.
Nashville, Chattanooga and St. Louis R. R.
Kentucky Central R. R.
Chicago, Milwaukee and St. Paul R. R.
Southern Pacific R. R.
Gulf, Colorado and Santa Fe R. R.
Milwaukee and Northern R. R.
Norfolk and Western R. R.
Wisconsin Central R. R.
Pittsburg, Cincinnati and St. Louis R. R.
Chicago, St. Louis and Pacific R. R.
Chicago, Burlington and Northern R. R.
Chicago, St. Paul, Minneapolis & Omaha R. R.
Delaware and Hudson Canal Co.
St. Paul, Minneapolis and Manitoba R. R.
Atchison, Topeka and Santa Fe R. R.
Milwaukee, Lake Shore and Western R. R.
Louisville and Nashville R. R.
St. Louis, Arkansas and Texas R. R.
Minnesota and Northwestern R. R.
Richmond and Danville R. R.
Chicago, Burlington and Quincy R. R.
Burlington, Cedar Rapids and Northern R. R.
Chesapeake and Ohio R. R.
Houston and Texas Central R. R.
Elgin, Joliet and Northern R. R.
Toledo, St. Louis and Kansas City R. R.
Montana Union R. R.
Georgia Pacific R. R.
East Tennessee, Virginia and Georgia R. R.
Florida Southern R. R.
Florida Railway and Navigation Co.
Louisville, Evansville and St. Louis R. R.
Wheeling and Lake Erie R. R.
Central Railway of Georgia.
New York, Chicago and St. Louis R. R.
New York and New England R. R.
New York Central and Hudson River R. R.
Michigan Central R. R.
Haskell and Barker Car Co.
Lafayette Car Works.
Wells & French Co.
St. Charles Car Manufacturing Co.
Terre Haute Car Works.
Lima Car Works.
Missouri Car and Foundry Co.
Litchfield Car Works.
W. C. Allison Car Works.
Michigan Car Works.
Youngstown Car and Manufacturing Co.
Griffin Wheel and Foundry Co.
Otis Steel Co.
Griffin Car Wheel Co.
Huntingdon Car Manufacturing Co.
Eastern Forge Co.
Mount Vernon Car Works.
Atlanta Car Co.
Minnesota Car Co.
Bass Foundry and Machine Works.
Baltimore Car Wheel Co.
Pullman Palace Car Co.

Etc., Etc.

TESTIMONIALS.

Delaware, Lackawanna and Western Railroad Co.

OFFICE OF MACHINE SHOPS,
SCRANTON, PA., June 13, 1890.

Niles Tool Works, Hamilton, O.

Gentlemen:—Having had one of your 79-inch Driving Wheel Lathes in constant use for the past four years, we can truly say we consider it as fine a tool as can be desired, both as to capacity and quality of work. Yours truly, CHAS. GRAHAM,
Master Mechanic.

The Lake Shore and Michigan Southern Railway Co.

CAR DEPARTMENT,
CLEVELAND, O., March 5, 1890.

Niles Tool Works, Hamilton, O.

Gentlemen:—This company has had one of your Lathes for turning steel-tired wheels in use for three years, and considers it an exceedingly good tool. We turn the tires of from four to six pairs of 36 and 42-inch wheels in ten hours, according to the degree of hardness of the tire. We use this Lathe for preparing new tire for retiring wheels, chucking both tires at the same time. Yours truly, JOHN KIRBY,
General Master Car Builder.

Cincinnati, Hamilton and Dayton Railroad.

OFFICE SUPT. OF MOTIVE POWER,
LIMA, O., June 28, 1889.

Niles Tool Works, Hamilton, O.

Gentlemen:—We purchased from your company in the summer of 1887 one of your 79-inch Double Head Wheel Lathes for turning locomotive tires. This machine was set up and put in use in November, 1887, since which time it has been in constant service. The machine has been kept constantly running during the working hours of each day, and in many cases making over-time at night, and I am pleased to say it is the best tool of the kind I have ever had the pleasure of operating, doing its work to our entire satisfaction in every respect.

Yours truly, C. H. CORY,
Supt. Motive Power.

The Delaware, Lackawanna and Western Railroad Co.

MORRIS AND ESSEX SHOPS,
DOVER, N. J., March 5, 1890.

Niles Tool Works, Hamilton, O.

Gentlemen:—Your favor of the 3d inst., asking about the working of your Steel-Tired Wheel Lathe now being used at these shops, came safely to hand, and in reply would say that we have often put the tires of a pair of 36-inch wheels in proper shape in just two hours, and at other times we have handled four pairs in ten hours; then again we have only handled three pairs in ten hours. It is all owing to the hardness and condition of the tires, as regards spots that have been slid flat, etc. We do, however, consider your machine the best for the purpose now in existence, and, should we need another, would ask to have this one duplicated.

Very truly yours, J. W. BAKER,
Master Car Repairer.

The Otis Steel Co., Limited.

Niles Tool Works, Hamilton, O. CLEVELAND, O., October 20, 1890.

Gentlemen:—Noting your favor of the 14th inst., we have now in use at our works four of your Axle Lathes, and it affords us pleasure to state that they are all that you claim for them. They have certainly given us entire satisfaction.

Yours truly, THOS. JOPLING,
Managing Director.

Paige Car Wheel Co.

Niles Tool Works, Hamilton, O. CLEVELAND, O., June 11, 1888.

Gentlemen:—We have had the No. 2 Hydrostatic Press that we bought of you in September, 1886, in use every working day since then. Have had no occasion to have repairs made, and it has given us entire satisfaction in every respect.

Very truly, W. S. DODGE,
Treasurer.

Rochester Car Wheel Works.

Niles Tool Works, Hamilton, O. ROCHESTER, N. Y., Oct. 17, 1890.

Gentlemen:—In reply to your letter of October 14th, in relation to the two Axle Lathes of your make in use in our works, purchased from you some little time ago, would say that we are obtaining the best of results from same, and are perfectly satisfied with the Lathes in every respect. Yours very truly, C. T. CHAPIN,
President.

The Griffin Wheel and Foundry Co.

Niles Tool Works, Hamilton, O. CHICAGO, June 15, 1889.

Gentlemen:—In answer to your inquiry would say we have used several different makes of Car Wheel Borers and Axle Lathes, and do not hesitate to say that we have found those of your make superior to any others we have used in style of machine, quality of work and economy of repair. Our last order was placed with you solely on the merit of the machine as demonstrated in our own shop. We are glad to be able to testify to their excellence.

Yours truly,
GRIFFIN WHEEL AND FOUNDRY CO.,
A. E. WELLINGTON.

Chicago and Northwestern Railway Co.

OFFICE SUPT. OF CAR DEPARTMENT,
Niles Tool Works, Hamilton, O. CHICAGO, March 10, 1890.

Gentlemen:—Your letter to G. W. Tilton, Superintendent Motive Power and Machinery, relative to the Tire Lathe procured of your company some three years ago, which has since been used in the car department at these shops for turning steel-tired wheels, has been referred to me. Will say in reply that we are very well satisfied, indeed, with the service we have been getting from this Lathe. We turn from three to four pairs of 33's, 36's and 42's per day, as we have all three sizes in service, average being based on the three sizes used.

Yours truly, C. A. SCHROYER,
Supt. Car Department.

Michigan Central Railroad Co.

MASTER CAR BUILDER'S OFFICE,
DETROIT, MICH., March 5, 1890.

Niles Tool Works, Hamilton, O.

Gentlemen:—Yours of the 25th ult. to our Mr. Smart has been referred to me, as the machine in question is in my department. The Wheel Lathe is giving perfect satisfaction. We can turn up four pairs of 42-inch wheels in ten hours, if the tires are not extraordinarily bad.

Yours truly, E. D. BRONNER,
Master Car Builder.

Indianapolis Car and Manufacturing Co.

Niles Tool Works, Hamilton, O. INDIANAPOLIS, IND., June 19, 1888.

Gentlemen:—We have had in use for years your improved Double Axle Lathes, and find the improvements—both in feed and driving power—make it superior to any other. One man will turn out eighteen or twenty axles in ten hours, and we would have no hesitancy in recommending this to any person wanting such a tool.

INDIANAPOLIS CAR AND MANUFACTURING CO.

Missouri Pacific Railway Co.

Niles Tool Works, Hamilton, O. ST. LOUIS, August 6, 1890.

Gentlemen:—In answer to your inquiry relative to Wheel Lathe which we purchased from your company about a year ago, I desire to say I consider this tool superior to any we have yet used. Owing to its being built very heavy and strong in detail, we are able to accomplish a larger amount of work with it. I can cheerfully recommend this tool to anyone requiring a tool for heavy, rapid work. Yours truly, L. BARTLETT,
Master Mechanic.

Barney & Smith Manufacturing Co., Dayton, O.

Niles Tool Works, Hamilton, O.

Gentlemen:—We have five of your patent Double Axle Lathes and know by experience with other types that we can do nearly double the amount of work on your Double Lathe that can be done on others.

The product of these Lathes is true and round, and the axles are not bent but are perfectly true. Yours,

EDWARD E. BARNEY.

The Boies Steel Car Wheel Works.

Niles Tool Works, Hamilton, O. SCRANTON, PA., June 15, 1890.

Gentlemen:—The equipment of tools which you furnished for my new Car Wheel Works, in 1887, it gives me pleasure to say, is working very satisfactorily, and the tools are accomplishing rather more than we expected to do with them. Since we have got the shop down to regular work we have had but little lost time on account of breakages, although running the machines up to their fullest capacity. The workmanship of your tools is superior, and the designs calculated for a high degree of strength.

It will always give me pleasure to commend your productions and recommend them to my friends. Yours very truly,

Boston and Maine Railroad.

Niles Tool Works, Hamilton, O. LAWRENCE, MASS., June 18, 1889.

Gentlemen:—With regard to the merits of our Lathe for turning steel-tired car wheels, which we purchased of you in March, 1887, I will say that the machine is doing good work, and that I can recommend it to parties wanting a first-class Lathe for turning steel-tired wheels.

Yours truly, D. C. RICHARDSON,
Master Car Builder.

The Georgia Pacific Railway Co.

Niles Tool Works, Hamilton, O. BIRMINGHAM, ALA., June 9, 1889.

Gentlemen:—We purchased of you in April, 1881, one of your No. 3 Hydrostatic Presses and put it in service immediately on its arrival. It was used during the change of gauge, we having to run it day and night for ninety days. It has been in service until now and has not cost us one cent for repairs. It is a most excellent tool, and I can take pleasure in recommending it to anyone who may wish one. Yours truly, WM. T. NEWMAN,
Master Mechanic.

Roanoke Machine Works.

Niles Tool Works, Hamilton, O. ROANOKE, VA., June 15, 1889.

Gentlemen:—Answering your favor of the 7th inst., we beg to advise that the use of your Double Axle machine has proven to be very successful with us. One man is able to turn on this machine fifteen iron axles, or ten steel axles, in a day of ten hours, which is considerably more than this same man can do with any of the single machines we have in the shop. We have two of your double machines in use, and they have given entire satisfaction.

Yours truly, ROANOKE MACHINE WORKS.

Kentucky Central Railway Co.

OFFICE OF MASTER MECHANIC,
Niles Tool Works, Hamilton, COVINGTON, KY., Aug. 23, 1890.

Gentlemen:—Our new shops are now in operation, all the machines having been placed in position and running. In regard to the machines purchased of your works, I have to say that I am more than pleased with them for fine finish and excellence of workmanship, and I consider our shops, for machinery equipment, second to none in the country. I take pleasure in recommending your tools as first-class in every respect.

Yours truly, S. R. TUGGLE,
Master Mechanic.

The Suburban Rapid Transit Co.

Niles Tool Works, Hamilton, O. NEW YORK, Oct. 17, 1890.

Gentlemen:—In reply to your letter of the 13th inst., I would say that the Niles Tool Works furnished us with the following equipments for our machine and blacksmith shop: Driving Wheel Lathe, Engine Lathes, Planers, Drill Presses, Engine, Boiler and Shafting, equipping our shop throughout. All of this machinery was put up under the supervision of your men, and has been running for the past ten months. We have had no trouble or expense since the shop was started. The tools are first-class, and do all the work they were intended to do. We think that the Suburban Rapid Transit Company has one of the best equipped shops, for a small one, that can be found in this section of the country.

Yours truly, E. B. WETMORE,
Supt. and Master Mechanic.

PART II.

SCREW MACHINES.

NILES TOOL WORKS,

HAMILTON, OHIO.

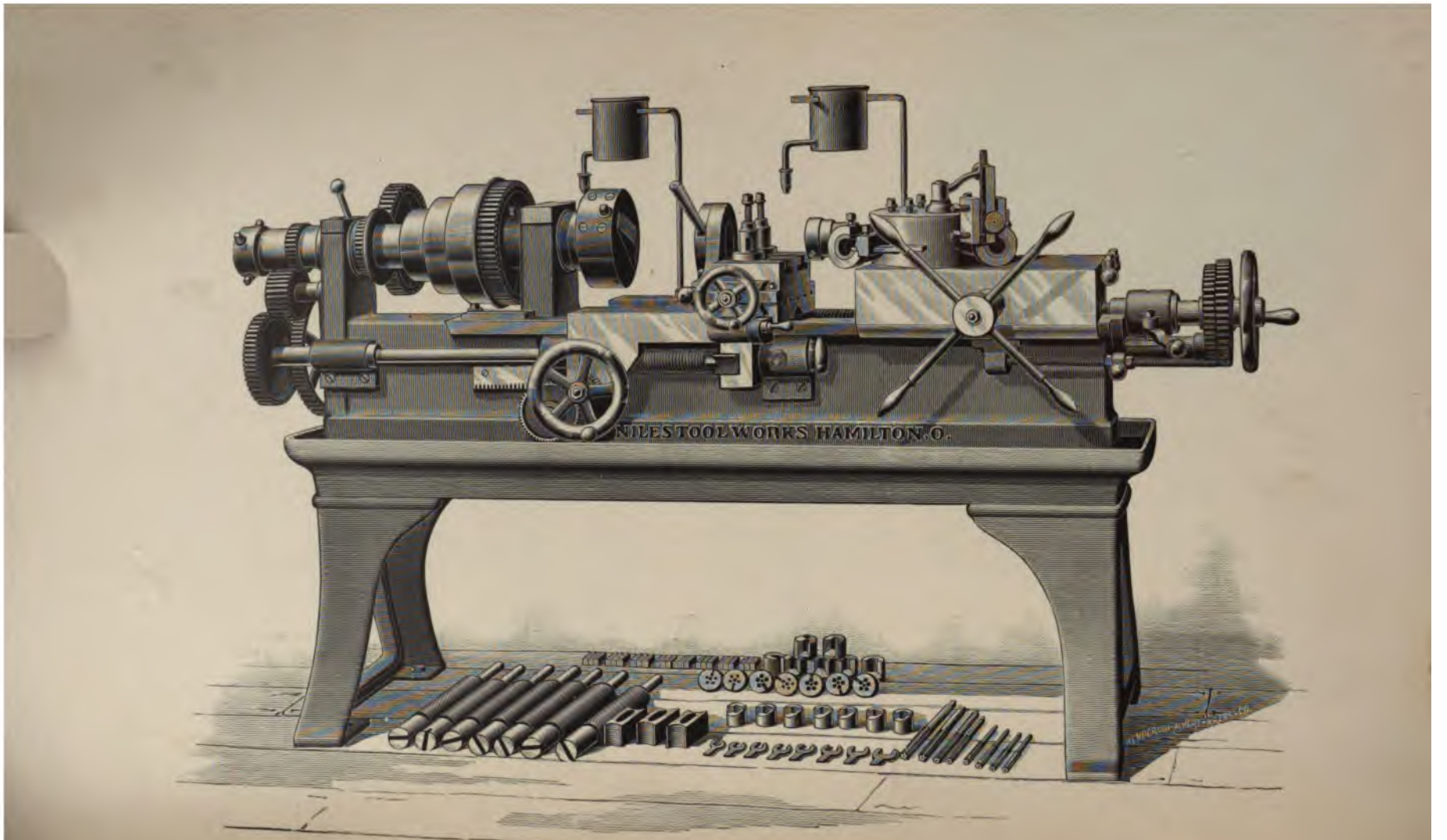


FIG. 1.—NO. 2 NILES SCREW MACHINE.

PART II.

Screw Machines.

THESE machines are invaluable for making set screws, tap screws, studs, and doing all descriptions of chasing. A great variety of other work can aiso be done on them at much less cost than on a lathe. Machines of this class have hitherto been made too light, and only capable of doing the smallest work.

Where the Screw Machine is known, or where its principle is understood, no words of introduction would be necessary; but we find so many interested parties to whom this entire subject is new that we have thought proper to treat the matter at some length. We therefore illustrate the machine in general and in detail, also its methods and products.

The Niles Screw Machine is a lathe with a hollow spindle having a chuck on each end; a carriage having a hand and power movement, and carrying two tools and a set of open screw-cutting dies; a sliding tail block having four means of feed, and carrying six tools to be applied to the work successively.

It will work to advantage on any kind of pieces which can be held in a chuck and which need the successive operation of several different tools.

The treatment of small work is entirely different from lathe operations. In lathe work a forged shape is trimmed and altered. The Screw Machine takes the rough bar and finishes the product. In this respect the Screw Machine represents on its work the blacksmith, the helper, the fire, the bolt header, the centering machine, the lathe, the lathe dogs, and the hole in which the lathesman tries his work. It wastes iron, but saves labor of much more value.

In lathe work a piece may, before being done, go in and out of the lathe many times. Dogs are put on and taken off several times. The lathe is stopped many times during changes, and trips are made to the vise or centering machine or blacksmith shop. The Screw Machine presents the end of a rough bar; the machine starts; successive tools do their work, and the job is finished before the machine stops or the workman leaves his position.

We have tested the time on such work in our own shop and found that work requiring thirty hours' time by the lathe plan was done in six and one-half hours on the Screw Machine. It is enough, however, to say that one Screw Machine will do work which would require three or four small lathes, and that the work is uniform in its excellence.

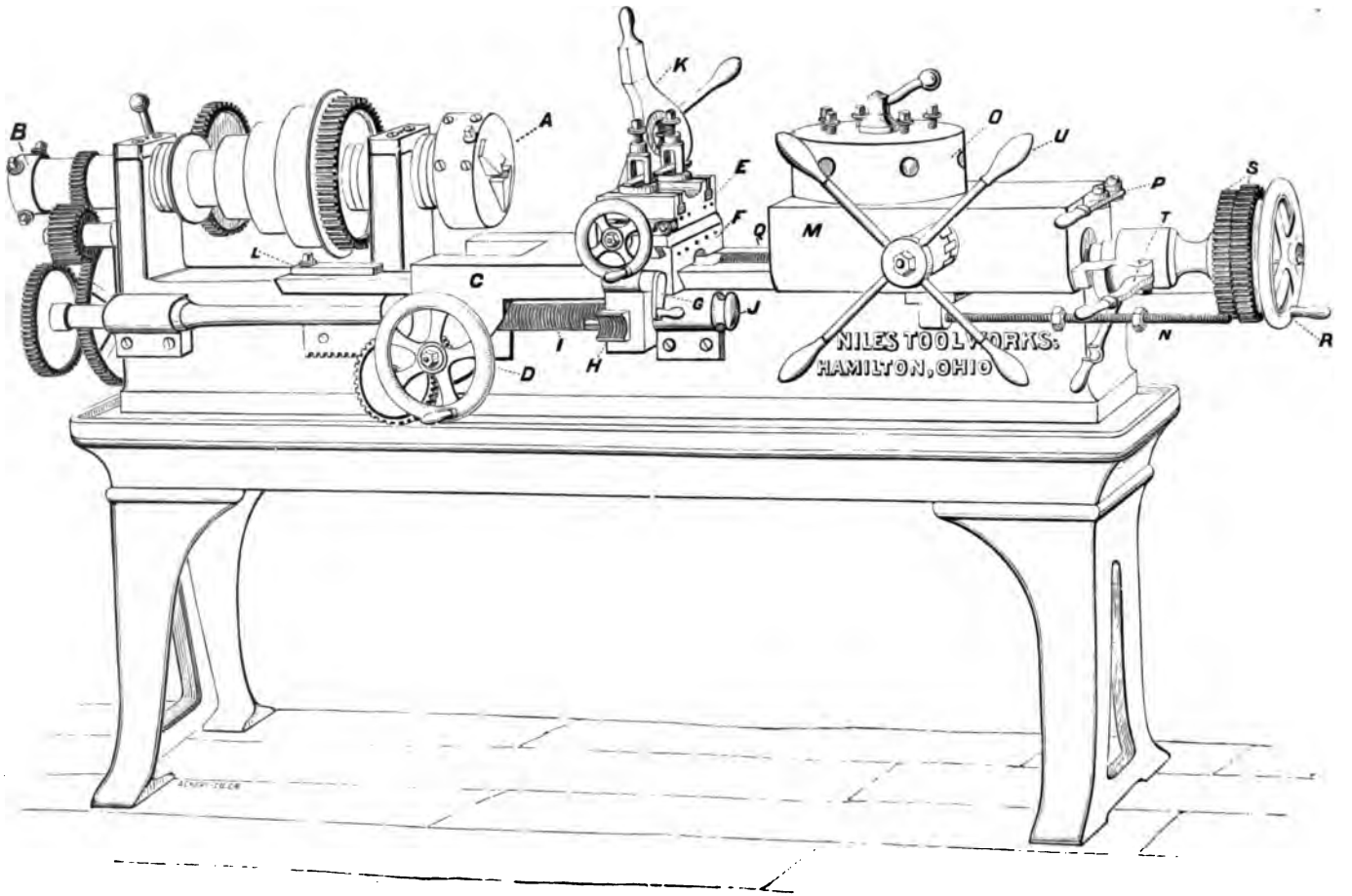


FIG. 2.—NO. 2 NILES SCREW MACHINE.

Detailed Description of Niles Screw Machine.

(SEE CUT ON OPPOSITE PAGE.)

THE chuck A has hardened steel V-shaped jaws. It is fast on the hollow arbor of the machine.

B is a steadying chuck on the rear end of the arbor. The arbor has a $2\frac{1}{16}$ inch hole through it, and its journals are very large and stiff. It is of steel and runs in gun metal boxes. The cone pulley and back gear is of the full proportion and power of an eighteen-inch lathe.

C is an ordinary lathe carriage fitted to slide on the bed and be operated by hand wheel D and a rack pinion as usual.

Across this carriage slides a tool rest E operated by screw, and having two tool posts, one to the front and one to the rear of the work. This tool rest, instead of sliding directly in the carriage as is the case with lathes, is mounted on an intermediate block which fits and slides in the carriage. This intermediate block is moved in and out, a short distance only, by means of a cam lever G. An apron on the front end of this slide carries the lead screw nut H. When the cam lever is raised it brings the slide outward about half an inch, and the tool rest E comes out with it, and at the same time the nut leaves the lead screw. The inward movement of the slide is always to the same point, thus engaging the lead screw and resetting the tool.

With this machine threads may be cut by adjusting a thread tool in the front tool post as in ordinary lathe practice, and at the end of the cut the cam lever serves to quickly withdraw the tool and lead screw nut so the carriage can be run back. The tool rest is then advanced slightly and the new cut taken. By this means threads are cut without any false motions, and may be cut close up to a shoulder.

I is the lead screw. This screw does not extend to the head of the machine, but is short and is socketed into a shaft which runs to the head of the machine and is driven by gearing. The lead screw is thus a plain shaft with a short, removable, threaded end. The gearing is never changed. Different lead screws are used for different threads, thus permitting threads to be cut without running back. The lead screws are changed in an instant by removing knob J. The lead screw nut H is a sectional nut, double-ended, so that each nut will do for two pitches, by turning it end for end in the apron.

L is an adjustable stop which determines the position of the carriage in cutting off, facing, etc.

K is an arm pivoted to the rear of the carriage and carrying three open dies like a bolt-cutter head. It is more fully described on page 46.

M is a block sliding on the bed.

N is a gauge screw attached to this block and provided with two nuts. The stop lever shown in the cut turns up to straddle this screw, and the position of the nuts determines how far each way the block may slide.

O is the turret fitted to turn on the block. It has six holes in its rim to receive sundry tools. It can be turned to bring any of these tools into action, and is secured by the lock lever P.

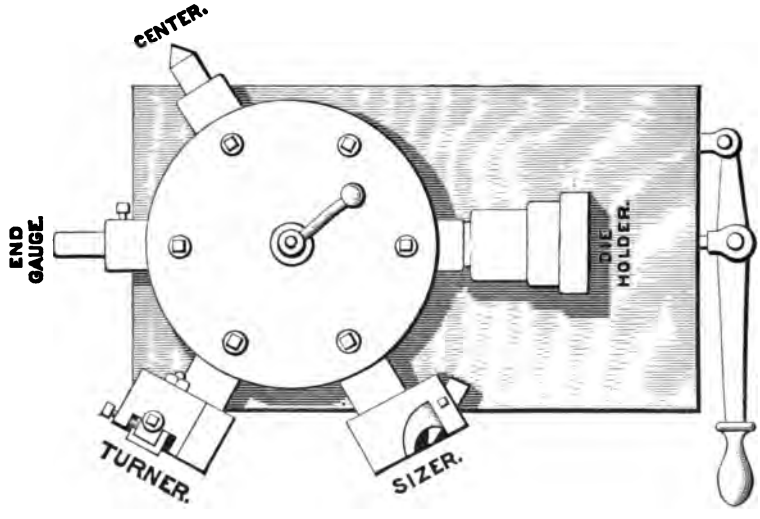


FIG. 3. PLAN OF TURRET.

The turret slide is moved quickly by hand, by means of the capstan levers U, which, by an in-and-out motion, also serve to lock the turret at any point. The turret slide is fed in heavy work by the hand wheel R on its tail screw. This tail screw carries, inside the hand wheel, two gears S, which are driven at different speeds by a back shaft behind the machine. These two gears are loose on the tail screw, and a clutch operated by lever T locks either one to the screw. Both the carriage and turret are provided with oil pots—not shown in the cuts.

The Turret Tools.

WE here illustrate the different forms of tools used in the turret on ordinary shop work.

FIG. 4. END GAUGE

THE END GAUGE, shown in Fig. 4, is simply a hollow shank A fitting the turret, and a gauge rod B fitting the shank. The shank may be set further in or out of the turret, and the rod may be set further in or out of the shank. The end gauge is so set that when the turret is clear back against its stop the end of the rod B will gauge the proper projections of the bar iron from the chuck of the machine.

FIG. 5. CENTER.

THE CENTER, shown in Fig. 5, explains itself. Is used only in chasing long work in steel.

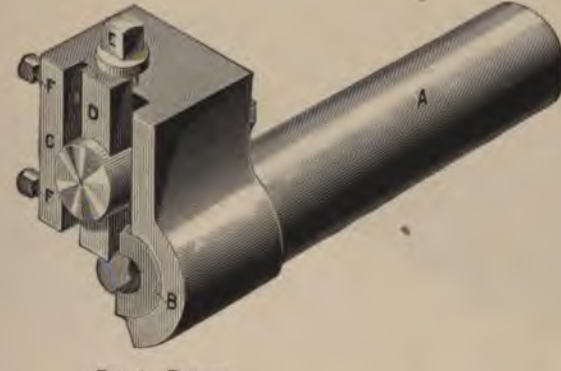


FIG. 6. TURNER.

THE TURNER, shown in Fig. 6, is a very peculiar tool. It consists of hollow shank A fitting the turret; a hardened bushing B held in its front end by a set-screw; a heavy, mortised bolt C in the front lug of the shank; an end-cutting tool D, shaped like a carpenter's mortising chise

the mortised bolt; a collar screw E to hold the tool endwise, and a pair of set-screws F to swivel the tool and its bolt. Bushing B is to suit the work in hand. The tool D is a piece of square steel hardened throughout. It is held by its bolt with just the proper clearance on its face. It cuts with its end without any springing, and will on this account stand a very keen angle

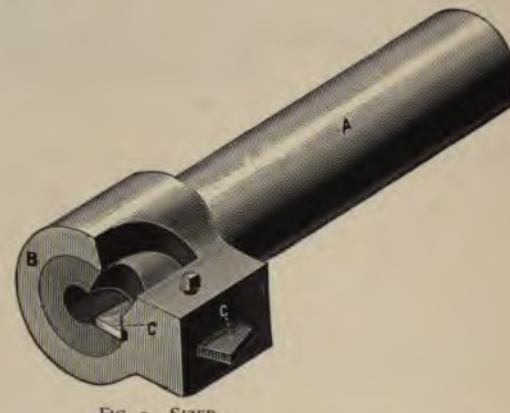


FIG. 7. SIZER.

of cutting edge. There is hardly any limit to its cutting power. It will cut an inch bar away at one trip with a coarse feed. It does not do smooth work, and is, therefore, used only to remove the bulk of the metal, leaving the sizer to follow.

THE SIZER, shown in Fig. 7, consists of a hollow shank A fitting the turret and carrying in its front end a hardened bushing B and a flat tool C.

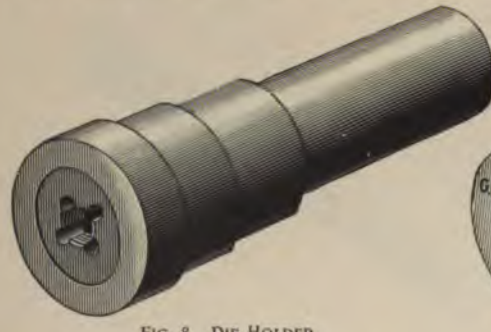


FIG. 8. DIE HOLDER.

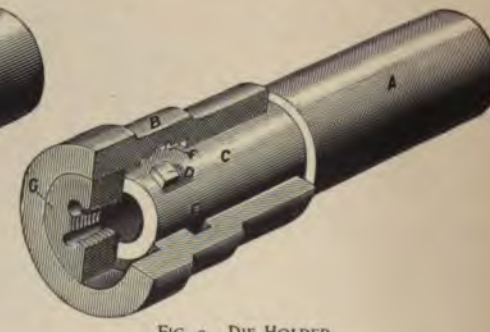


FIG. 9. DIE HOLDER.

The sizer follows the turner and takes a light water or oil cut, giving size and finish with a coarse feed. Having only light, clean work to do it holds its size nicely.

THE DIE HOLDER, shown in Figs. 8 and 9, is arranged to automatically stop cutting when the thread is cut far enough. It will cut a full thread

cleanly up against a solid shoulder. It consists of a hollow shank A fitting the turret; a sleeve B fitted to revolve and slide on the front end of the shank C; a groove E bored inside the sleeve; a pin D on the shank fitting freely in the groove E; a keyway F at one point in the groove and leading out each way from it, and a thread die G held in the front end of the sleeve. When the turret is run forward the thread die takes hold of the bolt to be cut, but it revolves idly instead of standing still to cut, until the pin D comes opposite the keyway F, when the turret still being moved forward the pin enters the back of the keyway. The sleeve now stands still, the die cuts the thread and pulls the turret along by the friction of the pin in the keyway. Finally the turret comes against its front stop and can move forward no further. Consequently the sleeve is drawn forward on its shank C, and the instant the pin D reaches the groove E the die and sleeve commence to revolve with the work and cease cutting. The machine is then run backward and the turret moved back a trifle. This causes the pin to catch in the front end of the keyway and the sleeve is again locked. The die then unscrews, and, in doing so, pushes the turret back. A tap holder may be inserted in place of the die, and plug taps may be run to an exact depth without danger.

BOX TOOL.—A box tool is a turret shank arranged to hold a series of cutters so as to produce work of several sizes, shoulders and shapes. Box tools are used only on special manufacturing work, and its construction will readily suggest itself when occasion requires. Fig. 25, on page 49, shows a wrist pin with three sizes. Such a thing, if needed in quantities, would justify the use of a box tool. For ordinary work several sizes are produced by using several separate turret tools like the sizer shown in Fig. 7, the heaviest cut being made by the turner shown in Fig. 6. There is hardly a limit to variety of cutting-tools which may be set in the turret to do the different parts of the work on a piece. Fancy end shapes, etc., as well as different effects on large, flat jobs, all come within the range of the turret operations.

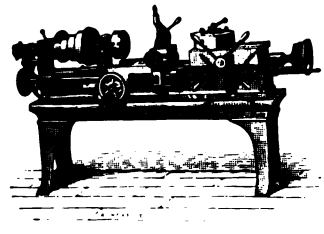
DRILLING.—Drills and other boring tools are held in suitable sockets fitting the turret.

THE CARRIAGE TOOLS.—The carriage has two tool posts in which are used ordinary lathe tools of various shapes. These two tools are used at different times, and the rear one cuts when backward.

One may be used as a roughing and shaping tool, and the other used with constantly keen edge to put on the final finish. Or one may be used to produce a shape on one part of the job and the other used to put a different shape on another part. Generally a cutting-off tool is kept in the rear tool post. In working on steel not well annealed it is not well to use dies, etc., which, under such circumstances, quickly lose their size and keenness. The front carriage tool is used as a chasing tool on such work in steel. In using the carriage tools no end measurements need be made on the work, as the carriage stop determines the limit of the carriage travel.

FIG. 10. HOB.

THE OPEN DIE ARM.—The open die arm is similar to a bolt cutter head. It is pivoted to the rear of the carriage and is turned forward when in use. It carries a set of open threading dies which can be kept sharp by grinding. The dies are very quickly changed from one size to another. They are re-cut by the hob, shown in Fig. 10, which is held in the chuck and turret center.



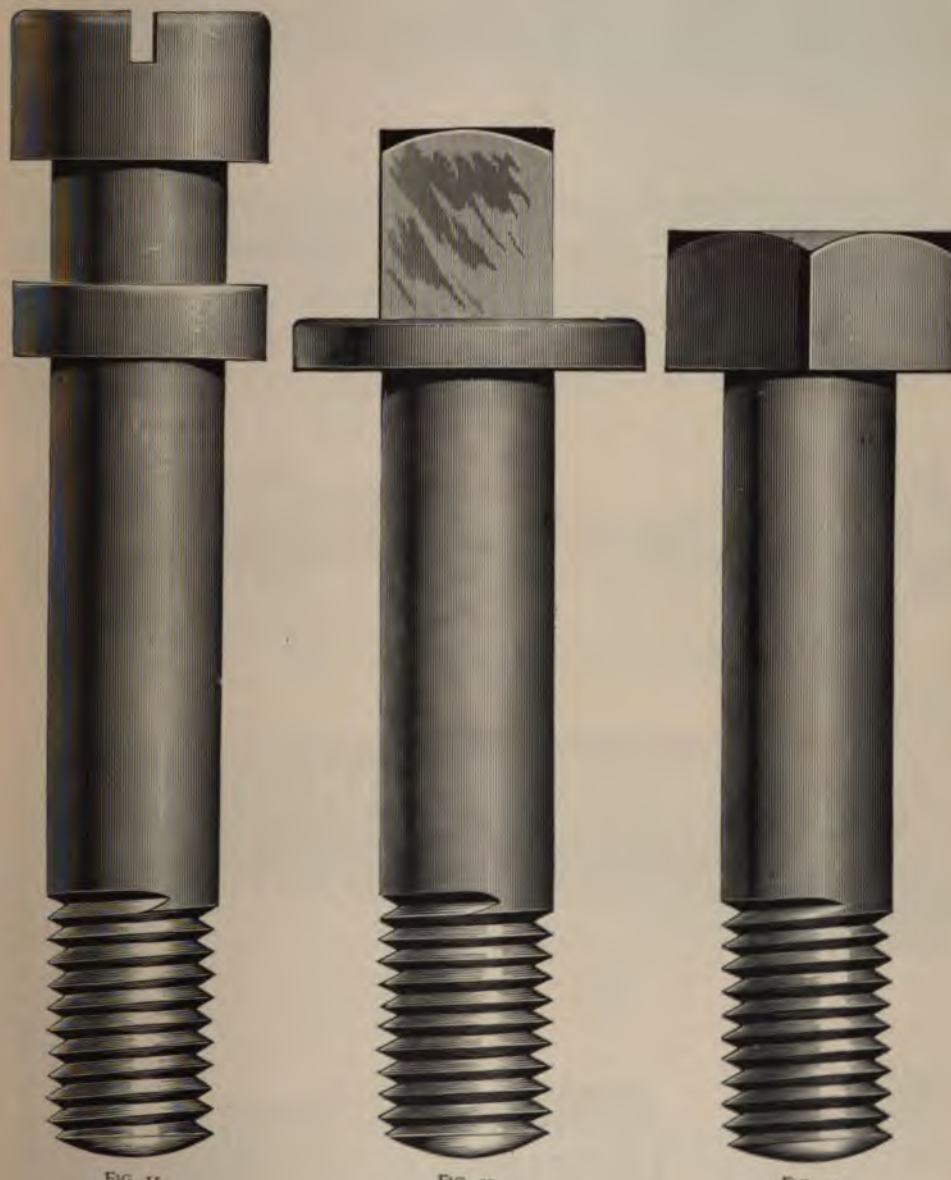


FIG. 11. FIG. 12. FIG. 13.

FULL-SIZE VIEW OF SAMPLES OF WORK DONE ON THE NILES SCREW MACHINE.

FIG. 14.

FIG. 15.

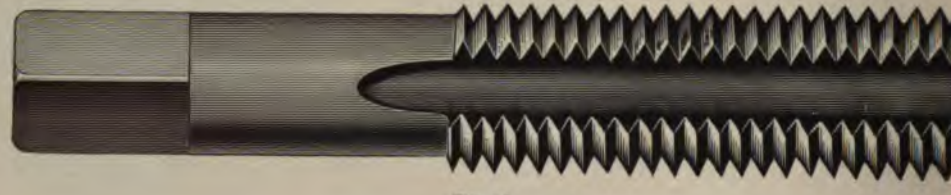


FIG. 16.

FIG. 17.

FIG. 18.

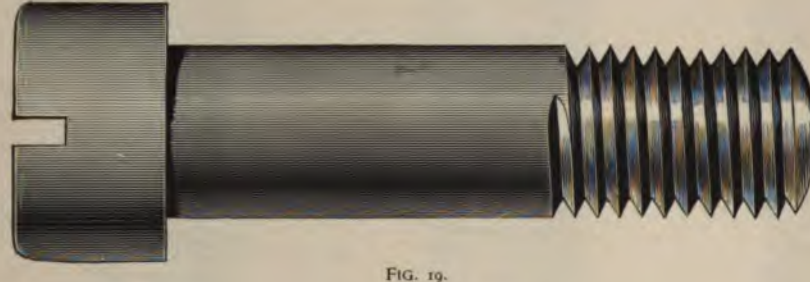


FIG. 19.

FIG. 22.

FIG. 21.

FIG. 20.

FULL-SIZE VIEW OF SAMPLES OF WORK DONE ON THE NILES SCREW MACHINE.

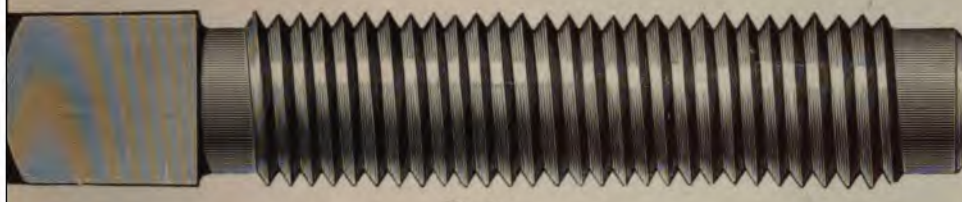


FIG. 23.

FIG. 24.

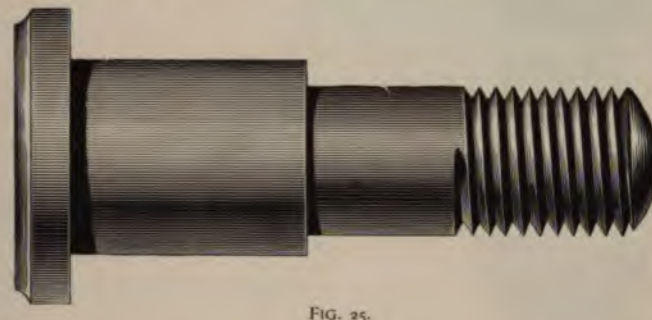


FIG. 25.

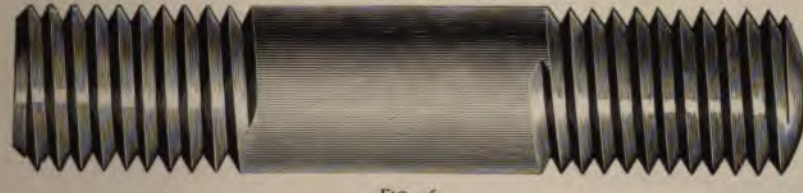


FIG. 26.

FIG. 28.

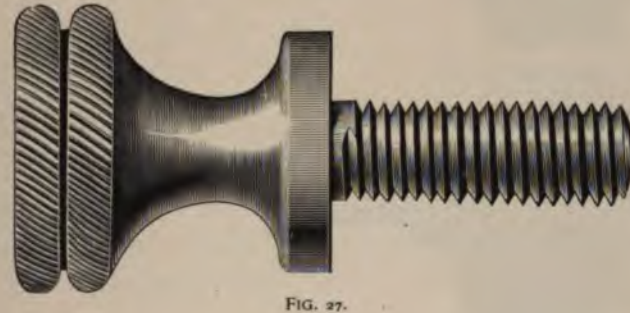


FIG. 27.

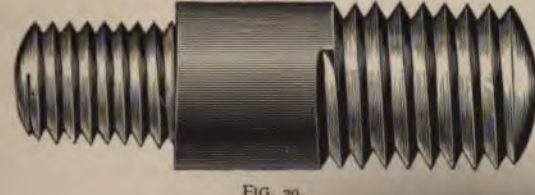


FIG. 29.

FULL-SIZE VIEW OF SAMPLES OF W

NILES SCREW MA

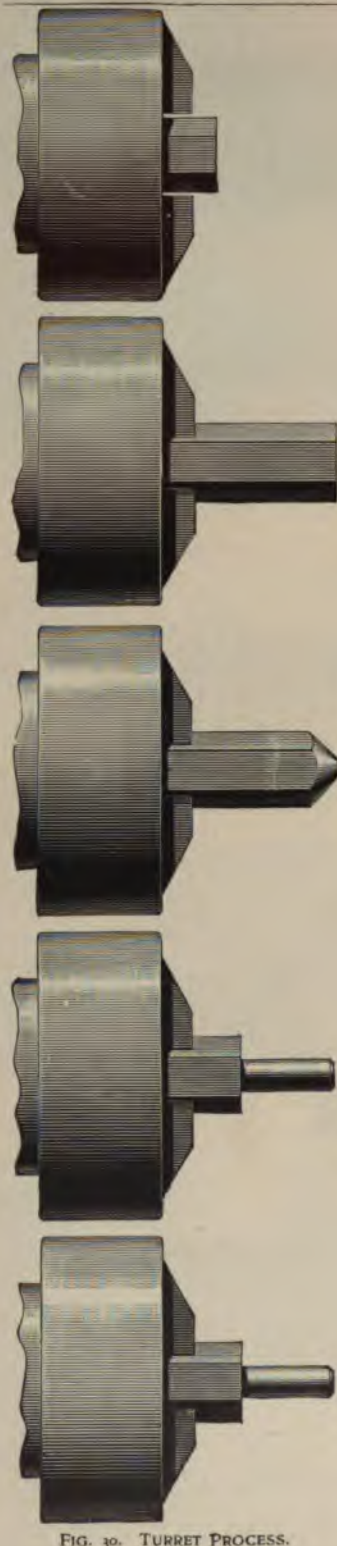


FIG. 30. TURRET PROCESS.

FIRST OPERATION.

The bar is inserted through the open chuck.

SECOND OPERATION.

Turret being clear back against its stop and revolved to bring present the END GAUGE, the bar is set against the end gauge and the chuck is tightened. This chucks the bar and leaves the proper length projecting from the chuck.

THIRD OPERATION.

Front tool in the carriage, a beveled side tool, cones the end of the bar so turret tools will start nicely.

FOURTH OPERATION.

Turret being revolved to present the TURNER, the bar is reduced at one heavy cut to near the proper size, the turret stop determining the length of the reduced portion.

FIFTH OPERATION.

Turret being revolved to present the SIZER, the body of the bolt is brought to exact size by a light, quick, sliding cut.

FIG. 31. TURRET PROCESS.

SIXTH OPERATION.

OPEN DIE ARM being brought down, the bolt is threaded, the left carriage stop indicating the length of the threaded part.

SEVENTH OPERATION.

Turret being revolved to present the DIE HOLDER the solid die is run over the bolt, bringing it to exact size with a light cut, and cutting full thread to the exact point desired.

EIGHTH OPERATION.

FRONT TOOL in the carriage chamfers off the end thread.

NINTH OPERATION.

BACK TOOL of carriage, a parting tool, cuts off the bolt; the left carriage stop determining the proper length of head.

TENTH OPERATION.

Bolt being reversed in chuck the top of the head is water-cut finished by a front tool in the carriage. This operation is deferred till all the bolts of the lot are ready for it.

TAPPING NUTS.—In tapping nuts on the Niles Screw Machine the common nut tapping process is followed. The nut tap, shown in Fig. 32, is clamped in the chuck and the nuts are held with a wrench. When the shank of the tap gets full of nuts the tap is taken out and the nuts removed. If nuts be bought ready

FIG. 32. NUT TAP.

tapped, or if there be a tapping machine in the shop, the Screw Machine need not, of course, do this work. There are, however, many special nuts often wanted, and it is well to arrange to make them on this machine.

FIG. 33. PATENT NUT MANDREL.

FACING NUTS.—Facing nuts on a mandrel between centers in a lathe is a ridiculously slow process, as the mandrel must be removed from the lathe two or three times for each nut. This consumes more time than the facing. It is well known that rough nuts can not be truly faced if strained up against the shoulder of a solid nut mandrel. Figs. 33 show the patent mandrel used by us. The free collar B allows the nut to adjust itself true with its thread. In facing nuts on the Niles Screw Machine the patent mandrel is clamped in the chuck and both carriage tools are used—the front tool, dressed to the proper curve, doing the rough, heavy work, and the back tool finishing afterward with a light water cut with the machine running backward. Nuts may be run on and off while the machine is running. We can supply these patent mandrels in sets for use in common lathes. They are of steel.

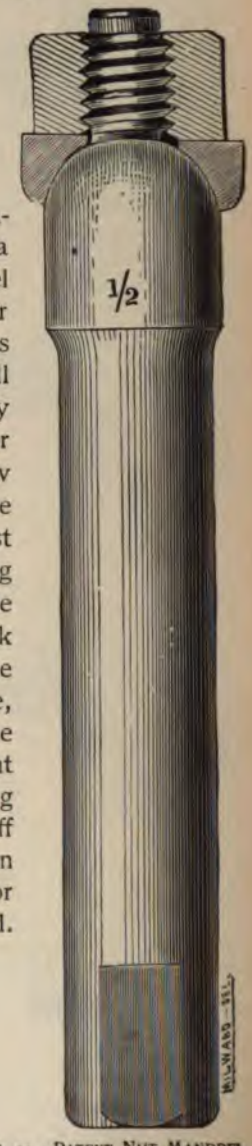


FIG. 33. PATENT NUT MANDREL

Range of Turret Operations.

THE intelligent mechanic, by inspecting this machine and analyzing the functions of the parts and movements, will quickly understand that in an ordinary machine shop there is hardly a limit to the usefulness of the machine. The name—Screw Machine—is calculated to create an impression that the machine is exclusively for screw and bolt work. The name arises from the fact that the turret principle was first employed in machines for making the screws used about sewing machines, etc. In such work these machines have been carried to a high degree of refinement, often being provided with wire feed, self-chucking devices, automatically revolving turrets and automatic carriage movements, whereby a rod of iron or steel being once chucked and the machine started, the machine needed no further attention till the rod was completely worked and a new one required. The automatic movements, quite feasible in these small machines, become impracticable and undesirable when the parts to be moved have great weight and heaviness of motion, and when the massive operations are necessarily slow.

From making screws only the machine advanced into making numerous small parts of sewing machines, guns, etc. Then came the Fox lathe for brass work, without which machine the elegant brass work of to-day would entirely fail in its uniformity of size and finish, and would be increased at least ten-fold in cost.

Now we find the machines making the heaviest screws, bolts, pins, handles, knobs, nuts, finished washers, rods, plugs, buttons, glands, flanges, followers, arms, collars, and similar lathe work. Numerous kinds of square and irregular castings, held in a suitable shifting chuck, can have a place faced here, a boss turned there, a recess cut, a hole drilled, a hole drilled and counterbored, a hole of one size drilled and tapped here, a hole of another size drilled and tapped there—and all with a cheapness and a uniform accuracy not attainable by the most complete outfit of separate machines. These machines are run by unskilled men, the care and setting of the tools, of course, being confided to a skilled man.

STANDARD SCREWS, HEADS AND NUTS.

Diameter of Screw.	Threads per inch.	Diameter at root of Thread.	Width of flat.	Short dia. of hex. or square.	Long Diameter Hexagon.	Long Diameter Square.	Thickness Nuts.	Thickness Heads.	Tap Drill.
	← 1 IN. →								
1/4	20	.185	.0062	1/2	37/64	7/10	1/4	1/4	3/16
5/16	18	.240	.0074	19/32	11/16	19/12	5/16	19/64	1/4
3/8	16	.294	.0078	11/16	51/64	63/64	3/8	11/32	5/16
7/16	14	.344	.0089	25/32	9/10	1 7/64	7/16	25/64	23/64
1/2	13	.400	.0096	7/8	1	1 15/64	1/2	7/16	13/32
9/16	12	.454	.0104	31/32	1 1/8	1 23/64	9/16	31/64	15/32
5/8	11	.507	.0113	1 1/16	1 7/32	1 1/2	5/8	17/32	17/32
3/4	10	.620	.0125	1 1/4	1 7/16	1 49/64	3/4	5/8	5/8
7/8	9	.731	.0138	1 7/16	1 21/32	2 1/32	7/8	23/32	3/4
1	8	.837	.0156	1 5/8	1 7/8	2 19/64	1	13/16	27/32
1 1/8	7	.940	.0178	1 13/16	2 3/32	2 9/16	1 1/8	29/32	31/32
1 1/4	7	1.065	.0178	2	2 5/16	2 53/64	1 1/4	1	1 3/32
1 3/8	6	1.160	.0208	2 3/16	2 17/32	3 3/32	1 3/8	1 3/32	1 3/16
1 1/2	6	1.284	.0208	2 3/8	2 3/4	3 23/64	1 1/2	1 3/16	1 9/32
1 5/8	5 1/2	1.389	.0227	2 9/16	2 31/32	3 5/8	1 5/8	1 9/32	1 13/32
1 3/4	5	1.491	.0250	2 3/4	3 3/16	3 57/64	1 3/4	1 3/8	1 1/2
1 7/8	5	1.616	.0250	2 15/16	3 13/32	4 5/32	1 7/8	1 15/32	1 5/8
2	4 1/2	1.712	.0277	3 1/8	3 5/8	4 27/64	2	1 9/16	1 3/4
2 1/4	4 1/2	1.962	.0277	3 1/2	4 1/16	4 63/64	2 1/4	1 3/4	1 31/32
2 1/2	4	2.176	.0312	3 7/8	4 1/2	5 31/64	2 1/2	1 15/16	2 3/16
2 3/4	4	2.426	.0312	4 1/4	4 29/32	6	2 3/4	2 1/8	2 7/16
3	3 1/2	2.629	.0357	4 5/8	5 3/8	6 17/32	3	2 5/16	2 5/8
3 1/4	3 1/2	2.879	.0357	5	5 13/16	7 1/16	3 1/4	2 1/2	2 29/32
3 1/2	3 1/4	3.100	.0384	5 3/8	6 7/64	7 39/64	3 1/2	2 11/16	3 1/32
3 3/4	3	3.317	.0413	5 3/4	6 21/32	8 1/8	3 3/4	2 7/8	3 11/32
4	3	3.567	.0413	6 1/8	7 3/32	8 41/64	4	3 1/16	3 19/32
4 1/4	2 7/8	3.798	.0435	6 1/2	7 9/16	9 3/16	4 1/4	3 1/4	3 13/16
4 1/2	2 3/4	4.028	.0454	6 7/8	7 31/32	9 3/4	4 1/2	3 7/16	4 1/32
4 3/4	2 5/8	4.256	.0476	7 1/4	8 13/32	10 1/4	4 3/4	3 5/8	4 9/32
5	2 1/2	4.480	.0500	7 5/8	8 27/32	10 49/64	5	3 13/16	4 1/2
5 1/4	2 1/2	4,730	.0500	8	9 9/32	11 29/64	5 1/4	4	4 3/4
5 1/2	2 3/8	4.953	.0526	8 3/8	9 23/32	11 7/8	5 1/2	4 3/16	4 31/32
5 3/4	2 3/8	5.203	.0526	8 3/4	10 5/32	12 5/8	5 3/4	4 3/8	5 7/32
6	2 1/4	5.423	.0555	9 1/8	10 19/32	12 15/16	6	4 9/16	5 7/16

Do not cut this page. Cardboard copies sent on application.

United States Standard Screws.

THE table on opposite page gives standard sizes for screws, heads and nuts, and we earnestly advise among our patrons its adoption. It is now used by all the first-class shops in the country, and taps and dies are made in accordance with it. The thread is not sharp at top or bottom, but is flattened, as shown in Fig. 34. This thread is most durable, permits best fitting, and the threading tools are durable. Darling, Brown & Sharpe supply gauges for giving shape of tool point. The angle is 60 degrees, and the flats equal one-eighth of the pitch.

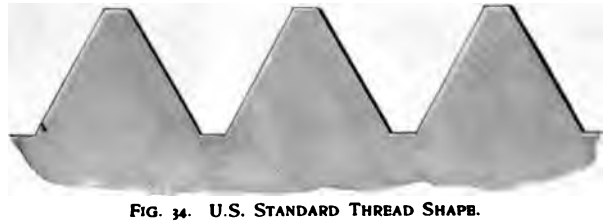


FIG. 34. U.S. STANDARD THREAD SHAPE.

MACHINE SCREWS.

There are no standards for the heads of machine screws, though there should be. We present below a table of sizes as used by us for many years. We know of nothing in its favor except that it is a list which secures uniformity with those who use it, and that it recognizes usual sizes of bar iron.

SIZES FOR MACHINE SCREWS.

Diameter of Screw.	Diameter of Head.	Length of Head.	Size of Slot.	Depth of Counterbore.
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{32}$	$\frac{1}{32} \times \frac{1}{16}$	$\frac{1}{8}$
$\frac{3}{16}$	$\frac{3}{8}$	$\frac{7}{32}$	$\frac{1}{32} \times \frac{1}{16}$	$\frac{3}{16}$
$\frac{1}{4}$	$\frac{7}{16}$	$\frac{7}{32}$	$\frac{1}{16} \times \frac{3}{32}$	$\frac{3}{16}$
$\frac{5}{16}$	$\frac{7}{16}$	$\frac{5}{16}$	$\frac{1}{16} \times \frac{1}{8}$	$\frac{1}{4}$
$\frac{3}{8}$	$\frac{9}{16}$	$\frac{3}{8}$	$\frac{1}{16} \times \frac{5}{32}$	$\frac{5}{16}$
$\frac{7}{16}$	$\frac{11}{16}$	$\frac{3}{8}$	$\frac{3}{32} \times \frac{5}{32}$	$\frac{6}{16}$
$\frac{1}{2}$	$\frac{11}{16}$	$\frac{7}{16}$	$\frac{3}{32} \times \frac{3}{16}$	$\frac{3}{8}$
$\frac{9}{16}$	$\frac{13}{16}$	$\frac{1}{2}$	$\frac{3}{32} \times \frac{3}{16}$	$\frac{7}{16}$
$\frac{5}{8}$	$\frac{15}{16}$	$\frac{1}{2}$	$\frac{3}{32} \times \frac{3}{16}$	$\frac{7}{16}$
$\frac{3}{4}$	$1\frac{1}{16}$	$\frac{9}{16}$	$\frac{1}{8} \times \frac{7}{32}$	$\frac{1}{2}$
$\frac{7}{8}$	$1\frac{5}{16}$	$\frac{3}{4}$	$\frac{1}{8} \times \frac{1}{4}$	$\frac{9}{16}$
1	$1\frac{7}{16}$	$\frac{7}{8}$	$\frac{5}{32} \times \frac{5}{16}$	$\frac{5}{8}$
$1\frac{1}{8}$	$1\frac{9}{16}$	1	$\frac{5}{32} \times \frac{3}{8}$	$\frac{7}{8}$

Accurate Sizes.

IN all kinds of shop work it is of great importance that sizes be uniform and accurate. Setting calipers by a scale will not give an accurate size, and as no two workmen would get exactly the same size it follows that there can be no uniformity in the sizes. In our own shop we use no loose calipers. We use solid gauges, hardened and ground and kept in shape by the tool room men. All the workmen consequently use the same size, and the sizes are as accurate as

FIG. 35. OUTSIDE CALIPER.

the tool makers can make them. In screw and bolt work the matter of sizes is a specially important one, and purchasers of our Screw Machines have generally been supplied by us with standard calipers.

Fig. 35 shows a standard one-inch solid caliper. It is of steel, hardened and brought to size after hardening. It is accurate to the ten-thousandth part of an inch. It is short and stumpy so as to slip from the fingers if crowded too tightly upon the work. These calipers can be furnished in sets running by sixteenths. If these outside calipers be true to size the workman can get inside sizes by

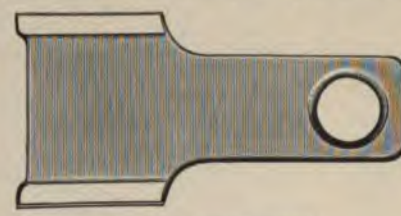


FIG. 36. INSIDE CALIPER.

setting his calipers to these. But these outside gauges will, of course, lose their size in time by strain. It is, therefore, important to have the accurate size preserved in male form, which is not subject to strains. With an accurate male size the outside calipers may be easily kept in good shape.

Fig. 36 shows a standard one-inch inside caliper, of hardened steel, brought true after hardening, and accurate to the ten-thousandth part of an inch. Such calipers may be put in regular use, or they may be carefully preserved as sizing gauges. We make free use of them in the shop.

Fig. 37 shows a step gauge, intended simply as a corrective gauge for outside calipers. It may be used to adjust the solid calipers by, or it may be used by workmen to set their common calipers by. It consists of a lot of accurately ground rings, made true to the ten-thousandth part of an inch, and strung on a

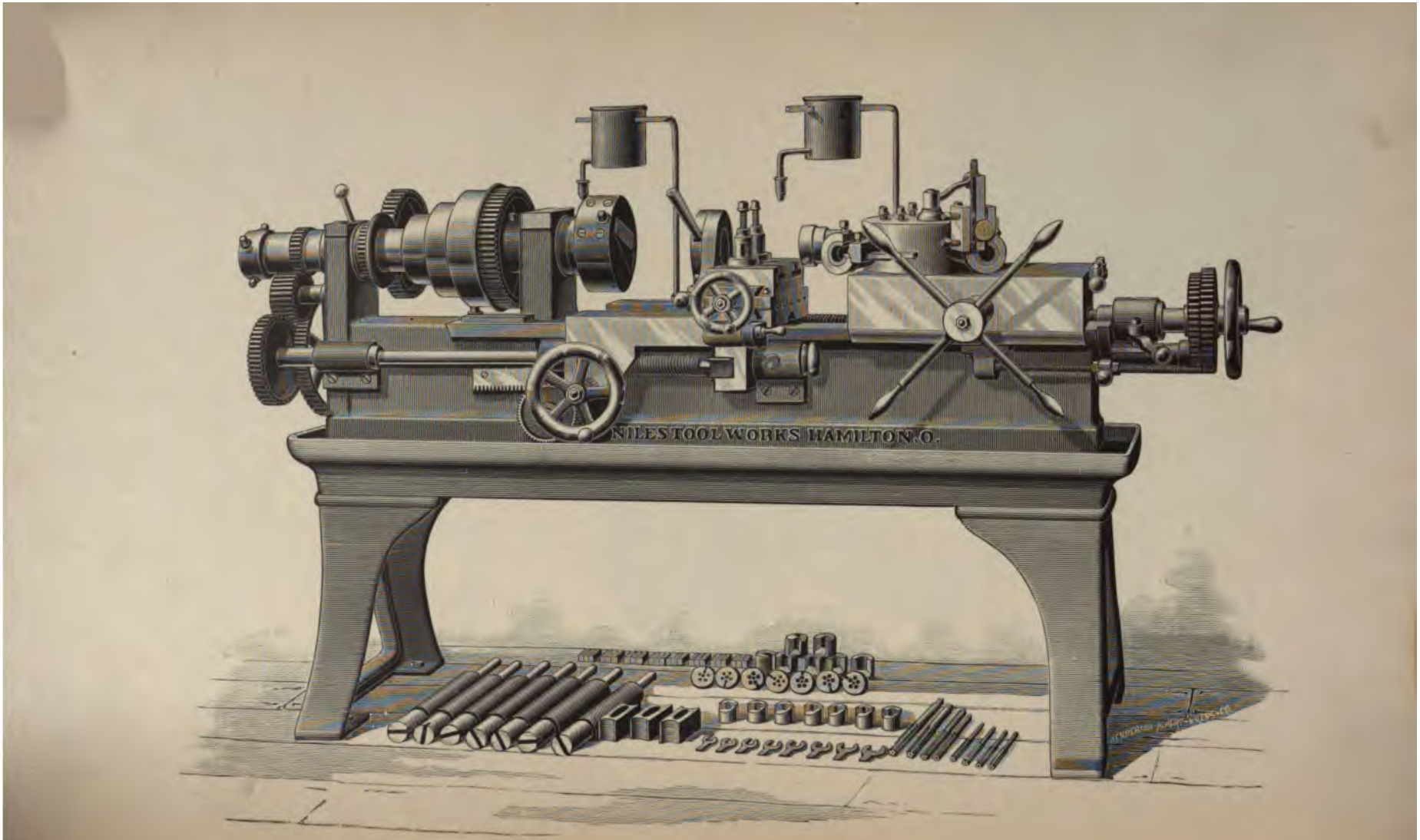
FIG. 37. STEP GAUGE.

rod having a handle. We can furnish these step gauges got up in most any range of sizes between one-eighth inch and four inches. For Screw Machine work we advise a step gauge one-eighth inch to one inch, running by sixteenths.

Fig. 38 shows a screw gauge. It consists of a male screw brought true to U.S. standard thread, and a female screw which fits it properly and which can be

FIG. 38. SCREW GAUGE.

kept to size. The female part is grooved so as to yield to adjustment and to clean nicely. These screw gauges are seldom used for regular shop work, but are carefully preserved as a means for keeping the regular tools to size. They are indispensable where a refinement of accuracy is required.



NO. 2 NILES SCREW MACHINE.

No. 2 Screw Machine.

(Patented March 6, 1883.)

THIS machine has all the requisite weight and power to operate advantageously on work its full swing. The cone has 4 speeds for a belt 2½ inches wide. The back gearing is strong and powerful. The spindle is steel, and has a hole through it $2\frac{1}{16}$ inches diameter; the journals are necessarily very large.

Every variety of screw, stud, tap bolts, etc., are made on this machine from the solid bar, requiring no forging, centering, or turning, and at a saving of fully fifty per cent. over the ordinary method of making screws.

The turret head is supplied with all the necessary tools for accomplishing the required purposes, such as sizing the work, or turning it standard diameter, pointing it, cupping it, or forming it in any desired uniform shape.

The carriage is provided with two tool posts, carrying tools for these different operations.

Adjustable stops regulate the length of the screw, the length of the head, the length of the thread, etc., with perfect uniformity.

Steel leading screws or hobs are furnished for chasing steel or pieces too large for the dies. The movement that engages the nut for screw-cutting also projects the tool, and, consequently, the movement that disengages the nut also withdraws the cutting tool from the thread; this arrangement dispenses with the necessity of turning the feed screw backward to relieve the tool from the thread; its movements are always forward in any degree desirable until the job is finished, which insures the greatest certainty in taking the desired amount of cut.

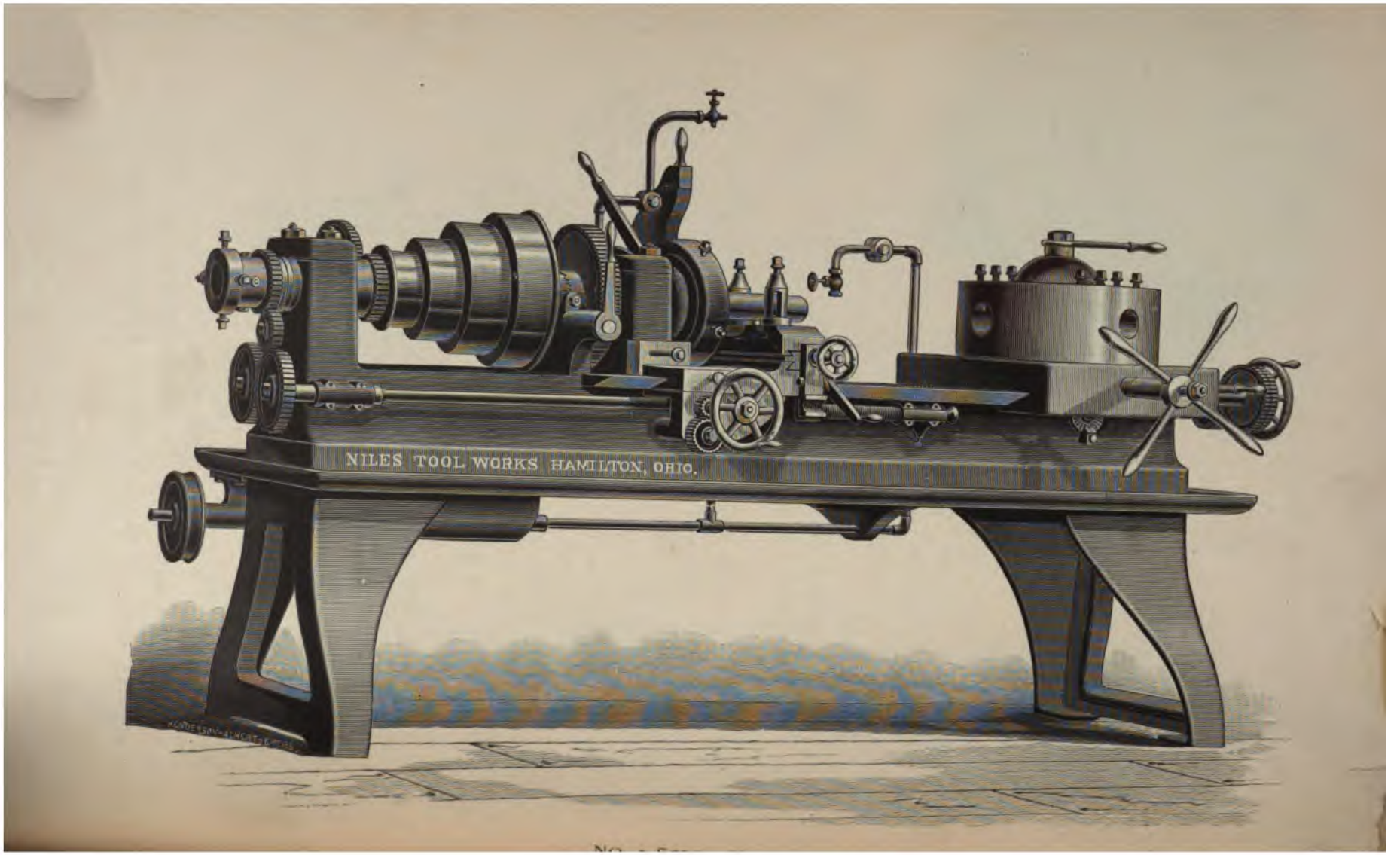
Tapping and facing nuts can be done rapidly.

The outfit usually furnished with the machine consists of taps, dies, etc., for cutting from ⅜ to 1 inch inclusive, as follows:

6 Machine Taps.
6 Standard Solid Dies.
6 Hobs for Dies.
6 Standard Caliper Gauges.
6 Steel Leading Screws.
3 Brass Nuts for Leading Screws, two threads on each.
6 Hobs for Leading Screw Nuts.
1 Opening Die Plate, with 6 sets of Dies.
2 Cutting Tool Holders, with 6 sets standard collars each.
1 Center.
1 Stop.
1 Die Holder.

The countershaft has three pulleys, 12 inches diameter, 5½ inc

Speed, forward, 140 revolutions; backward, 210 revolutions


NILES TOOL WORKS HAMILTON, OHIO.

No. 3 Screw Machine.

(Patented June 25, 1889.)

THIS is a very heavy and powerful machine, made from new patterns and embracing the latest patented improvements.

Capacity, ⅝-inch to 1½-inch screws.

Dies will work up to two inches. With the leaders threads can be cut up to full size of stock the machine will take.

The spindle is 4¼ inches diameter, with a front bearing 6¼ inches long, and has a hole 2 1/16 inches diameter through it.

The cone ranges from 14 inches to 7 inches diameter, and has four steps for a 3½ inch belt.

Both the cone and face gear are loose on the spindle, and are driven the one by a friction, the other by a tooth clutch, connected to a sliding hub splined to the spindle. The friction obviates the shock incident to starting the spindle at a high velocity, as the motion is gradual, while the tooth clutch on the face gear insures steadiness of motion under heavy strain.

The manner of mounting the turret and the arrangement of feeds, which have proved so satisfactory in the No. 2 machine, are still retained, while in addition the turret is made to revolve and lock automatically. The point at which the revolution of turret takes place is adjustable, and is indicated by a gauge at the front of the turret slide.

The carriage has a power feed operated from the back feed shaft, independent of the motion obtained by the leaders.

A pump is supplied with each machine which pumps the oil or water from a tank in the bed of the machine, and is provided with a safety valve whereby all excess of oil is returned to the tank, and allows the pump to continue working when the drip cocks at the tools are closed.

The outfit usually furnished with the machine consists of taps, dies, etc., for cutting from ⅝-inch to 1½ inches inclusive, as follows:

8 Machine Taps.
8 Standard Solid Dies.
8 Hobs for dies.
8 Standard Caliper Gauges.
8 Steel Leading Screws.
4 Brass Nuts for leading screws, two threads on each.
8 Hobs for leading screw nuts.
1 Opening Die Plate, with 8 sets of dies.
2 Cutting Tool Holders, with 8 sets of Standard Collars each.
1 Center.
1 Stop.
1 Die Holder for solid dies.

The countershaft has three pulleys 15 inches diameter, 8 inches face.

Speed—forward, 200 revolutions; backward, 300 revolutions per minute.

TESTIMONIALS AND REFERENCES.

REFERENCES.

Mexican National Railway.
Suburban Rapid Transit Co., New York.
Ohio and Mississippi R. R.
Union Pacific R. R.
Cincinnati, New Orleans & Texas Pacific R. R.
Southern Pacific R. R.
Philadelphia, Wilmington and Baltimore R. R.
Cleveland, Cincinnati, Chicago & St. Louis R.R.
Alabama Great Southern R. R.
Chicago, St. Paul and Minneapolis R. R.
Delaware, Lackawanna and Western R. R.
Atchison, Topeka and Santa Fe R. R.
St. Paul, Minneapolis and Manitoba R. R.
Chicago, Burlington and Quincy R. R.
St. Louis, Arkansas and Texas R. R.
St. Louis and San Francisco R. R.
Missouri Pacific R. R.
Morgan's Louisiana and Texas R. R.
Manhattan Railway.
Central Railway of New Jersey.
Chicago and Alton R. R.
Chicago, Milwaukee and St. Paul R. R.
Lehigh Valley R. R.
Kansas City, Fort Scott and Gulf R. R.
Pittsburg, Cincinnati and St. Louis R. R.
Burlington, Cedar Rapids & Northern R. R.
International and Great Northern R. R.
Dunmore Iron and Steel Co., Dunmore, Pa.
H. K. Porter & Co., Pittsburg, Pa.
Robt. Wetherill & Co., Chester, Pa.
Bartlett, Hayward & Co., Baltimore, Md.
J. A. Fay & Co., Cincinnati, O.
The Holly Mfg. Co., Lockport, N. Y.
Bridesburg Mfg. Co., Philadelphia, Pa.

TESTIMONIALS.

The Holly Manufacturing Co.

Niles Tool Works, Hamilton, O. LOCKPORT, N. Y., March 3, 1890.

Gentlemen:—The Screw Machine purchased of you in October, 1886, has proven to be of great value in our work. It has been constantly employed since its purchase, and has been used principally in making stud bolts. We find that we can make from two and one-half to three times as many with this machine as can be made on the ordinary lathe.

Yours truly, H. F. GASKILL,
Vice-President and Engineer.

Chicago, St. Paul, Minneapolis and Omaha Railway

MACHINERY DEPARTMENT,
Niles Tool Works, Hamilton, O. ST. PAUL, MINN., May 8, 1890.

Gentlemen:—Your letter, making inquiries in regard to my experience in the use of your Screw Machine, has been received. We have had one of these machines in constant service for more than three years at our St. Paul shops, and have just received another machine for St. Paul and one for Sioux City, making three machines now at work. I consider that each machine will do the work of three screw-cutting lathes and turn out equally good work. There is a very large range of locomotive work which can be done economically on these machines, such as studs, set screws, and bolts. The fact that we have purchased two additional machines, after using one for some months, will show you that I consider it a very valuable tool.

Yours truly, M. ELLIS,
Master Mechanic.

St. Louis and San Francisco Railway Co.

Niles Tool Works, Hamilton, O. NORTH SPRINGFIELD, MO., June 8, 1889.

Gentlemen:—Referring to yours of the 5th inst., will say that we have three of the Niles Screw machines in use in our Springfield shops, giving the best results.

Yours truly, J. R. GROVES,
Supt. Rolling Stock.

Columbus, Hocking Valley and Toledo Railway Co.

Niles Tool Works, Hamilton, O. COLUMBUS, O., Jan. 26, 1891.

Gentlemen:—Yours of the 17th inst. at hand. In reply would state that your Screw Machine has been in use for nearly a year, during which time it has given great satisfaction. For simplicity, durability and economy in the dispatch of work, we consider it the acme of tools in this line. Yours truly, W. H. MILLER,
Master Mechanic.

Office of Walter Scott & Co.

Niles Tool Works, Hamilton, O. PLAINFIELD, N. J., May 24, 1889.

Gentlemen:—The Screw Machine purchased of you three years ago has given us excellent satisfaction. We use it for making a great variety of studs, bolts, screws, pins, and such work as is generally used in the manufacture of printing machines. It can produce more work than four lathes. We could not get along without such a machine.

Yours truly, WALTER SCOTT & CO.

Office of H. K. Porter & Co.

Niles Tool Works, Hamilton, O. PITTSBURG, PA., Jan. 14, 1891.

Gentlemen:—We have been using one of your Screw Machines for about ten years, making all set-screws, small pins, stud bolts, etc.; making and cutting all studs and a variety of other small work, and have now two of them in use. The repairs have been merely nominal on the oldest machine, although constantly in use. We find such a machine indispensable, and think no shop can afford to do this kind of work by any other process.

Very truly yours, H. K. PORTER & CO.

St. Louis, Arkansas & Texas Railway.

Niles Tool Works, Hamilton, O. PINE BLUFF, ARK., Jan. 19, 1881.

Gentlemen:—The shops of this company at Pine Bluff were equipped with a number of tools of your make about three years and a half ago, and they have all given excellent satisfaction. Among other tools furnished this company were the following: Screw Machine, 79-inch Driving Wheel Lathe, Axle Lathe, 30-inch Lathe, 36-inch Lathe, 60-inch Planer, 36-inch Planer, 30-inch Planer, 16-inch Traveling Head Shaper, No. 1 Radial Drill, 18-inch Slotter, Power Bending Rolls, etc. When it becomes necessary to order any further equipment for shops, I would not hesitate to recommend your tools. Yours truly,

E. S. MARSHALL,
General Master Mechanic.

Office of Robt. Wetherill & Co.

Niles Tool Works, Hamilton, O. CHESTER, PA., October 28, 1890.

Gentlemen:—Replying to your favor of the 13th, the Screw Machine you furnished us in September, 1887, has been in constant use, has given us good satisfaction, and we cheerfully recommend it.

Respectfully yours,
ROBT. WETHERILL & CO.

Office of Bartlett, Hayward & Co.

Niles Tool Works, Hamilton, O. BALTIMORE, MD., June 13, 1889.

Gentlemen:—We have your favor of 6th instant, requesting our opinion as to the merits of the Screw Machine purchased from you. In reply we have to say that we have not had occasion to do a great deal of work on this machine since it has been in our possession. Such as we have had, however, justifies us in the assertion that with the proper handling of same by one of our mechanics it will do the work of three or four lathes. The machine is easily manipulated, and gives entire satisfaction.

Very respectfully,
BARTLETT, HAYWARD & CO.

The Kidder Press Manufacturing Co.

Niles Tool Works, Hamilton, O. BOSTON, MASS., March 9, 1890.

Gentlemen:—Your letter of February 28th came duly to hand, and in reply to your inquiry as to the efficiency of your Screw Machine, we are pleased to write you that it is a first-class tool. For the greater part of our work it does the work of from two to three engine lathes. We use it mostly for turning studs and cutting special screws, such as can not be bought from dealers. We would not part with it for a great variety of work.

Very truly yours,
KIDDER PRESS MFG. CO.
F. MEISEL, Supt.

Cincinnati, Indianapolis, St. Louis & Chicago Railway Co.

Niles Tool Works, Hamilton, O. CINCINNATI, April 19, 1887.

Gentlemen:—In answer to yours respecting work we are doing upon the Screw Machine purchased from your works some time back, will say this machine will turn out three times as much work as one of the best improved small lathes of the class of work it is intended for. We have used it mostly for all kinds of screw bolts with square or hexagon heads, or round heads for counter sunk holes. We make all kinds of studs with threads on both ends; also by using variable dies we make all bolts and studs for boiler work requiring steam-tight threads. We also face all sizes of nuts, etc. I consider this machine almost indispensable, and would hardly know how we could get along without it.

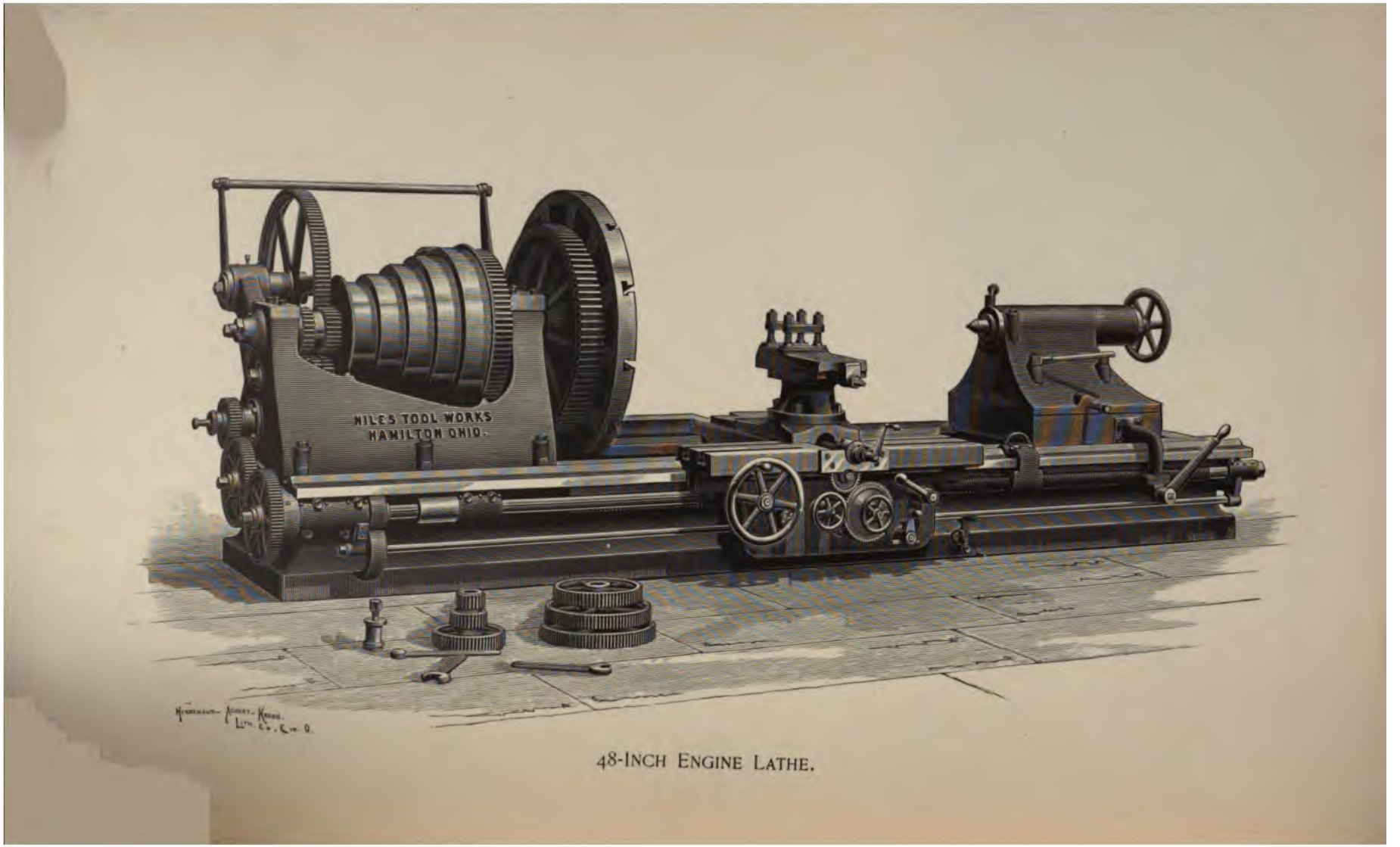
Respectfully yours, J. S. PATTERSON,
Master Mechanic.

PART III.

ENGINE LATHES.

NILES TOOL WORKS,

HAMILTON, OHIO



48-INCH ENGINE LATHE.

PART III.

General Description of Lathes.

THESE Lathes are all built from new designs embodying the latest improvements, and all the parts are calculated to withstand the heavy duty imposed by modern machine shop practice.

The beds are of very large section, strongly cross-girted and braced, and the ways are of extra large proportions to give ample wearing surfaces.

The head stocks are made of a very strong and rigid form. They are webbed entirely across under the cones both to insure stiffness and permit the use of as large driving cones as possible. This form of construction gives the greatest amount of pulling power possible in the range of the swing.

The cones are strongly back geared, and the ratio is calculated to give a regular gradation of speed from the slowest to the fastest. They bear their whole length on the spindle.

The spindles are made of open hearth steel, are of large size and run in composition boxes. They have exceptionally large and long bearings, very accurately fitted.

The tail stocks have also large spindles and set-over for turning tapers. On the larger sizes they are arranged with rollers mounted on eccentric studs. One turn of the wrench engages the rollers with the bed, and thus the tail stocks can be easily adjusted by one man. The larger sizes have separate holding-bolts for the upper and lower slide, so that the set-over can be adjusted without releasing the tail stock.

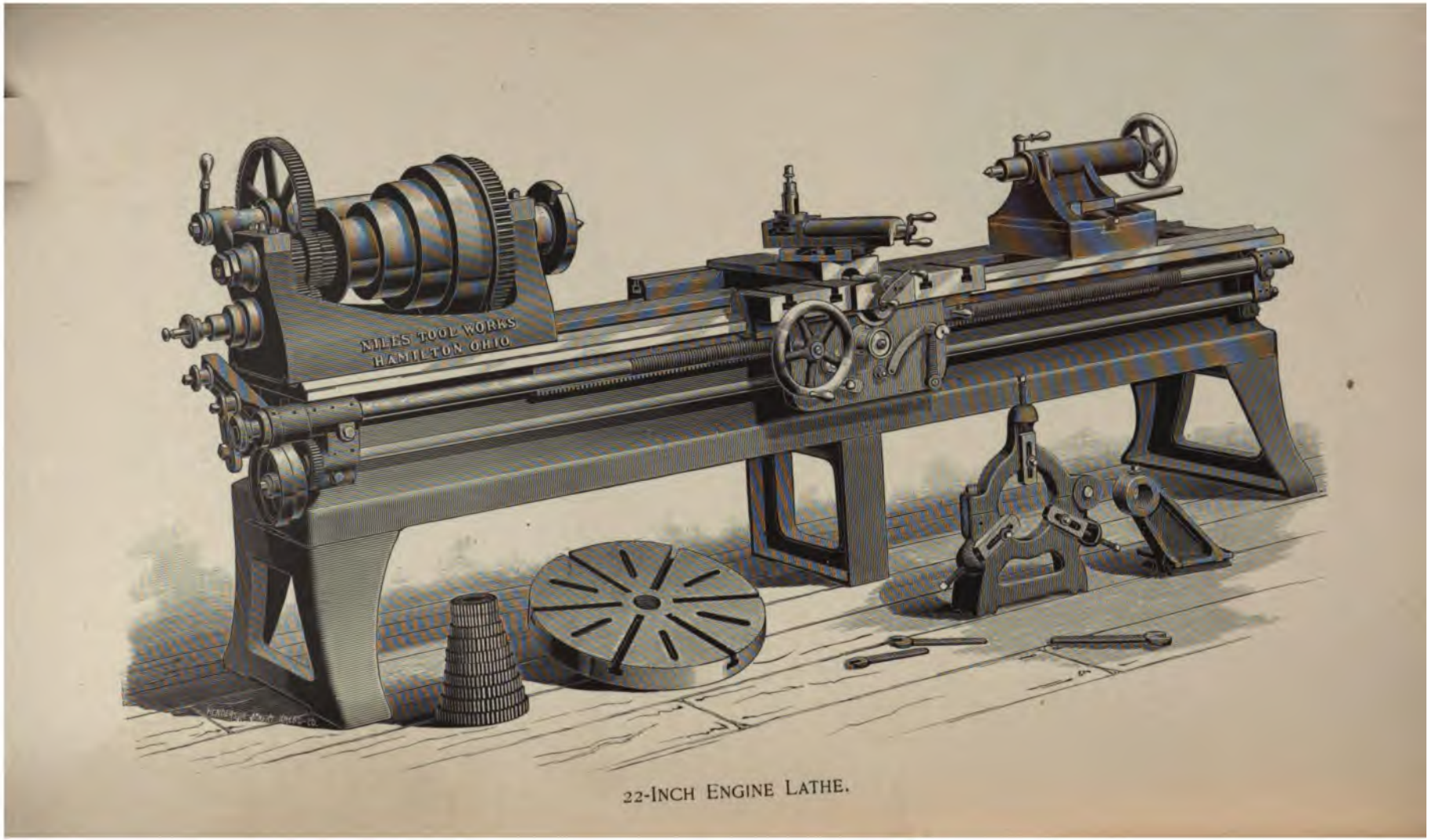
The carriages are made very long and bear their entire length on the ways. They are gibbed front and back and the aprons are very strongly secured to them. The apron gears have large and long bearings thoroughly braced and tied together. The tool rest is so mounted as to be removable, and thus present the entire carriage surface for bolting work. This is an important feature for shops not supplied with regular boring machines.

All our Lathes up to 36 inches swing have the feeds reversed at the carriage apron. We regard this arrangement more convenient for the quick handling required in smaller sizes. The reversing lever is so arranged that when the feed is engaged it is impossible to close the lead screw nut.

All sizes up to 48 inches swing have two speeds to the change-gear stud, controlled by in-and-out pin, thus giving two feed ratios with every change of gear, both for feeding and screw cutting.

Each Lathe is provided with compound rest and power cross feed. The cross feed ranges the entire width of the face plate and is as powerful as the longitudinal feed. All Lathes are fitted up in the best possible manner to insure durability of wear [illegible] Surfaces are fitted by scraping, no emery being used, and [illegible]ard gauges.

Each Lat[illegible]eady rests, large and small face plates, scre[illegible]



22-INCH ENGINE LATHE.

18-Inch Engine Lathe.

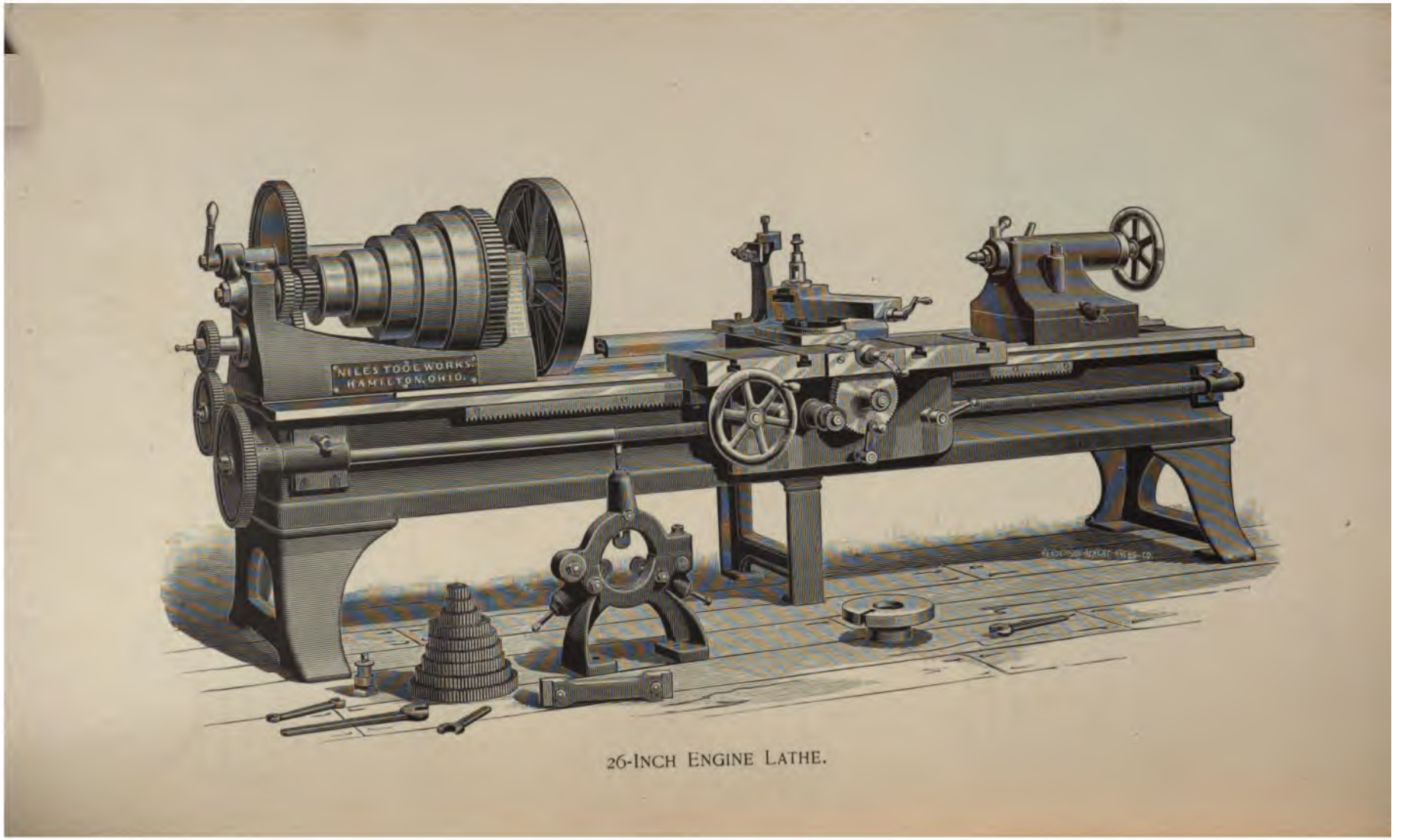
SWINGS 18 inches over the ways and 11 inches over the carriage.
With bed 6 feet long it will take in 24 inches between centers.
Cone has four steps for a 2¾-inch belt.
Spindle is three inches in diameter and has front bearing 4¼ inches long.
The carriage is 32 inches long and has rod feed reversed at the apron.
Lathe is provided with compound rest and power cross feed.
Countershaft has 3 pulleys 12 inches diameter, 6 inches face, and should run 100 revolutions per minute for forward speed, and 200 revolutions in backing.
Weight with 6-foot bed, 2400 lbs.

22-Inch Engine Lathe.

SWINGS 22 inches over the ways and 15 inches over the carriage.
With bed 8 feet long it will turn 42 inches in length.
Cone has four steps for a 3-inch belt.
The spindle is 3½ inches in diameter, with a front bearing 5 inches long.
The carriage is 36 inches long and has rod feed reversed at the apron.
Lathe is provided with compound rest and power cross feed.
The lead screw is cut full length and can be reversed when worn.
Countershaft has three pulleys 12 inches diameter, 6½-inch face, and should run on forward speed 100, and on backing speed 200 revolutions per minute.
Weight with 8-foot bed, 3300 lbs.

26-Inch Engine Lathe.

SWINGS 26 inches over the ways and 19 inches over the carriage.
With bed 10 feet long it will turn in length 52 inches.
The cone has five steps for a 3½-inch belt.
The spindle is 4½ inches in diameter. Front bearing is 6 inches long.
The carriage is 42 inches long. The feed is by splined screw connected to the spindle by gearing, and is reversed at the apron.
The Lathe is provided with power cross feed and compound rest.
Countershaft has three pulleys 18 inches diameter, 7½ inches face, and should run 80 and 120 revolutions per minute.
Weight with 10-foot bed, 7400 lbs.



26-Inch Engine Lathe.

30-Inch Engine Lathe.

SWINGS 30 inches over the ways and 22 inches over the carriage.

With bed 10 feet long it will turn in length 48 inches.

The cone has five steps for a 4-inch belt.

The spindle is 4½ inches diameter. Front bearing is 6 inches long. The carriage is 44 inches long. The feed is by splined screw connected to the spindle by gearing and is reversed at the apron.

The Lathe is provided with power cross feed and compound rest.

Countershaft has three pulleys 20 inches diameter, 7½ inches face, and should run 75 and 115 revolutions per minute.

Weight with 10-foot bed, 8000 lbs.

Shafting Lathes.

THE 26 and 30-inch Lathes are especially recommended for turning shafting. We make two styles of shafting rests for this purpose. One is intended more for occasional use, and has two tools on the front and one at the back of the rest. The other style, which we furnish for continuous use, consists of a heavy rest base provided with a tank and pump. It has two tools immediately preceding, and one following, the shafting ring. All three are in front.

Both these rests are equipped with our patent split collars. These are so made that they are perfectly rigid when in place, and yet can be easily inserted when the end of the shaft is turned to receive them, without removing it from the Lathe.

When desired we arrange these Lathes with a driving gear on the tail stock. This arrangement permits turning a shaft its entire length without removal from the centers.

36-Inch Engine Lathe.

SWINGS 36 inches over the ways and 27 inches over the carriage.

With bed 12 feet 6 inches long it will turn 6 feet in length.

The cone has five steps for a 4-inch belt, ranging from 22 to 8 inches.

The spindle is 5 inches diameter, and front bearing is 7 inches long.

The carriage is 48 inches long.

The apron gearing is driven by a splined rod connected to the spindle by gearing, and is reversed by tumbler gear in the headstock.

The lead screw is supported its entire length in a planed trough.

Each Lathe is provided with power cross feed and compound rest.

Countershaft has three pulleys 22 inches in diameter by 7½ inches face, and should run 65 and 100 revolutions per minute.

Weight, with 12-foot 6-inch bed, 12,000 lbs.

NOTE.—When desired this Lathe can be furnished triple geared to fifteen changes of speed.

42-Inch Engine Lathe.

SWINGS 42 inches over the ways and 32 inches over the carriage.
With a bed 12 feet 8 inches long it will turn 6 feet in length.

The cone has five steps for a 4-inch belt, and is triple geared to the face plate, giving fifteen changes of speed.

The spindle is 5½ inches in diameter, with a front bearing 7 inches long.

The carriage is 53 inches long.

The apron gearing is driven by a splined rod connected by gearing to the spindle, and is reversed by tumbler gear in the headstock.

The lead screw is supported its entire length in a planed trough.

Compound rest and power cross feed are provided.

This Lathe has great power and is adapted to a wide range of work.

Countershaft has three pulleys 18 inches diameter, 8 inches face, and should run 105 revolutions per minute.

48-Inch Engine Lathe.

(See cut Page 68.)

SWINGS 48 inches over the ways and 36 inches over the carriage.
With a bed 16 feet 3 inches long it will turn 8 feet in length.

The cone has five steps for a 4-inch belt, ranging from 27½ to 15¼ inches in diameter, and is triple geared to the face plate, giving fifteen changes of speed.

The spindle is 6½ inches in diameter, with a front bearing 9 inches long.

The carriage is 54 inches long.

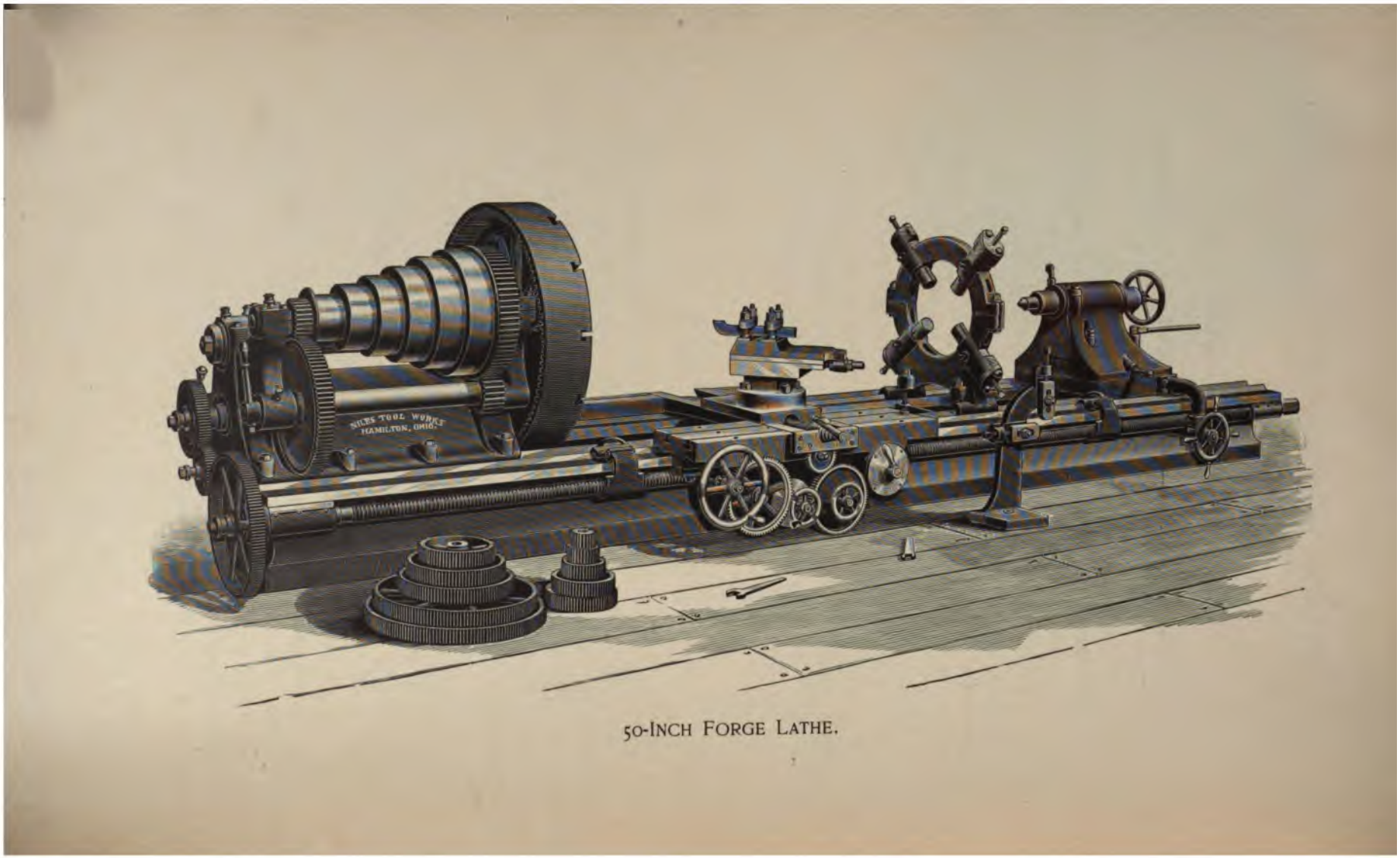
The apron gearing is driven by a splined rod connected by gearing to the spindle, and is reversed at the apron.

The lead screw is provided with a cut-off coupling so that it can be disconnected from the feed gearing, except when in use for screw cutting.

Three changes of feed for each setting of gears are obtained by means of an in-and-out pin. By this means a large number of fractional pitches can be cut without the necessity of first cutting special gearing.

Compound rest and power cross feed are provided.

Countershaft has three pulleys 26 inches diameter, 8 inches face, and should run on forward speed 75, and on backing speed 125 revolutions per minute.



50-INCH FORGE LATHE.

50-Inch Swing Forge Lathe.

A machine of immense weight, strength and power, designed for turning forged shafts and work of a similar character.

Swings 50 inches diameter over the ways and 38 inches over the carriage.

With 16-foot bed will turn 7 feet 4 inches between centers.

The cone has six steps for a belt 4½ inches wide. It is strongly back geared, giving twelve changes of speed. The various speeds are accurately calculated for even gradations, from the fastest to the slowest. The cone is mounted on an independent steel spindle, with a pinion of steel, working into an internal gear on the back of the face plate.

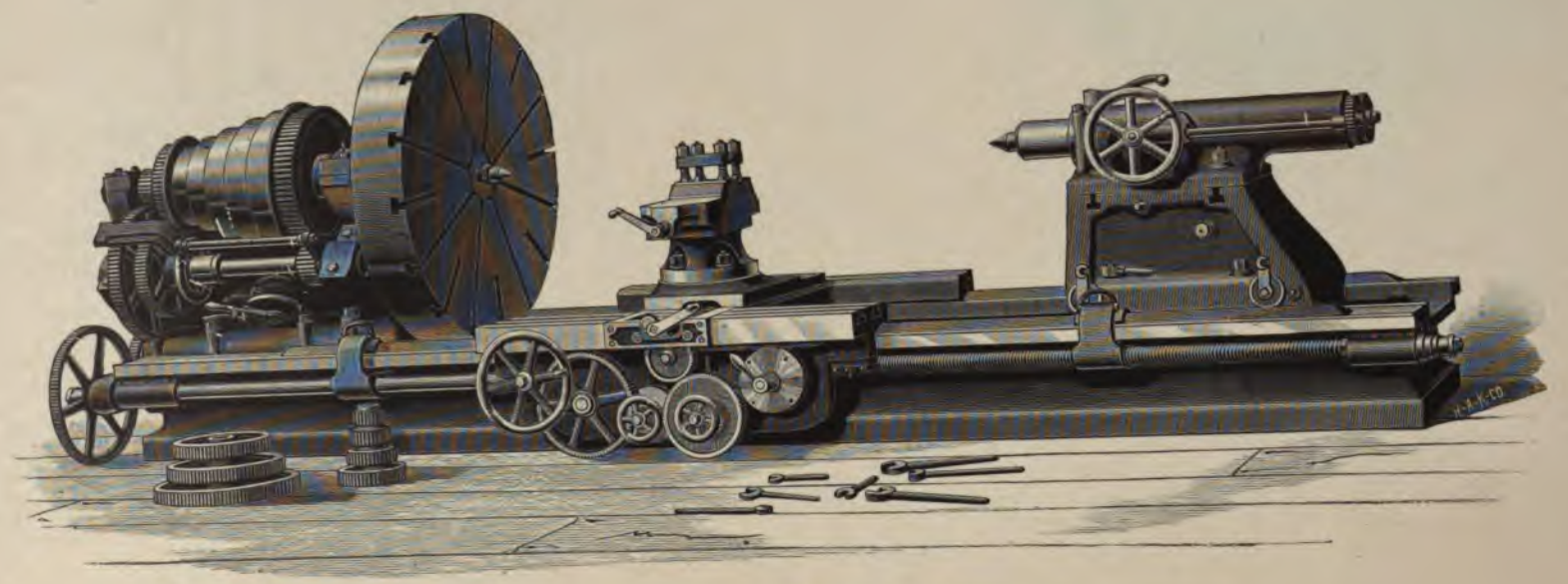
The face plate is carried on a separate spindle of steel. Front spindle bearing 7 inches diameter, 10½ inches long. The internal gear on the face plate, and all other gearing, is accurately cut from the solid. The tail stock is secured by four bolts and has set-over for tapers. It is provided with rack and pinion gear for easy manipulation. One man can easily handle it. It is also provided with a strong pawl engaging a rack in the bed, thus offering a positive resistance.

The carriage is 5 feet long, and very substantial in construction. It is gibbed front and back. The rest has compound movement. The tool is held by four studs and clamps. The cross feed may be operated the entire width of the face plate, and is as strongly geared as the longitudinal feed.

Feeds operate through gearing made extra strong for the heaviest work. The lead screw is of steel 3 inches diameter. The screw is placed well up under the flange of the bed, and the nut is immediately below the carriage, bringing the strain as direct as possible.

The Lathe is provided with an extra heavy steady rest to take in work of large diameter, and will carry between centers a forged shaft weighing 22 tons.

Countershaft has two pulleys 20 inches diameter, 6 inches face, to run 200 revolutions, and two pulleys 18 inches diameter, 6 inches face, to run 250



60-INCH HEAVY FORGE LATHE.

60-Inch Heavy Forge Lathe.

THIS Lathe is built from entirely new patterns, and is made extra heavy and strong throughout. It is designed for use in forges for rough turning or finishing heavy shafts, rolls, cranks, etc.; also for machine shop use when extra duty is required, as in turning and boring large steel castings. The duty imposed on machine tools in such cases is enormous, and Lathes of ordinary weight and construction are not able to withstand it.

The Lathe swings 60 inches over the ways and 46 inches over the carriage.

With a bed 16 feet long it will turn 6 feet between centers.

The cone is mounted on an independent steel spindle, with a steel pinion gearing into an internal gear on the back of the face plate. It has five steps for a 4½-inch belt, and has two sets of back gears, thus giving fifteen changes of speed to the face plate. These speeds are all calculated for even gradations, from the slowest to the fastest.

The main spindle is 10 inches in diameter at the front end, and the bearing is 15 inches long. The face plate is bolted fast to it.

The carriage is 68 inches long, and is made of a very stiff form. It is accurately fitted to the bed its entire length, and is gibbed both front and back.

The rest has compound movement, with longitudinal, cross and angular power feed.

The feed mechanism is made in the very strongest manner, and very rigidly supported in the apron to enable it to withstand the severe duty imposed. The feed reversal is by strong tumbler gearing in the head, so that no change in the stud gear is needed in cutting either right or left-hand threads.

The feed reversing lever is very conveniently placed on the front side of the head stock.

The lead screw is placed well up under the shears of the bed, and the nut so arranged as to bring the strain on the carriage as direct as possible.

The tail stock is held down by four bolts, and is also provided with a strong pawl engaging with a rack cast in the bed. This arrangement offers a positive resistance, thus preventing all danger of slipping. The
aised or lowered by a hand knob on the side of the tail stock.
r slide of the tail stock is also held independently by four
rement allows the tail stock to be set over for taper

work without unclamping from the bed, and is very convenient when working with heavy pieces.

The Lathe is provided with very heavy steady and follower rests. The steady rest has its opening of extra size to admit large shafts.

The countershaft has two sets of tight and loose pulleys 24 inches diameter and 6 inches face. These should run respectively 100 and 150 revolutions per minute.

72-Inch Swing Engine Lathe.

SWINGS 72¾ inches diameter over the ways and 54 inches over the carriage. With 18-foot bed will turn 8 feet between centers.

The cone has five steps for a belt 5 inches wide. Double set of back gear is provided, giving fifteen changes of speed, calculated for an even gradation from the fastest to the slowest. The cone is mounted on an independent steel spindle, with a steel pinion, working into an internal gear on the back of the face plate.

The face plate is carried on a separate spindle, with front bearing 11½ by 16 inches. The internal gear on the face plate and all other gearing are accurately cut from the solid.

The tail stock is secured by four bolts and has a set-over for tapers. It is provided with four rollers for quick and easy manipulation, and has bearings 38 inches long. It is also provided with a strong pawl engaging a rack cast in the bed.

The carriage is 5 feet 6 inches long, and very substantial in construction. It is gibbed front and back. The bed has great width, viz.: 5 feet 4 inches over the top, and depth of 24 inches.

The rest has compound movement, with power cross feed and power feed to upper tool slide. Tool is held by four clamps and studs.

All the feed gear is made extra strong for heavy duty.

Lead screw is of steel, 3⅛ inches diameter. The screw is placed well up under the flange of the bed, with nut directly under the carriage ways.

The Lathe is provided with an extra heavy steady rest to take in work of large diameter. The Lathe will carry between centers a forged shaft weighing 25 tons.

The Lathe is furnished with countershaft, steady rest, follower rest, screw gearing, wrenches, and every appliance to make a lathe complete.

Countershaft has two sets of pulleys—one set tight and loose pulleys, 28 inches diameter, 6½ inches face, to run 180 revolutions; one set tight and loose pulleys, 20 inches diameter, 5½ inches face, to run 250 revolutions.

TESTIMONIALS AND REFERENCES.

TESTIMONIALS.

Office of B. F. Sturtevant.

Niles Tool Works, Hamilton, O. BOSTON, MASS., Feb. 9, 1889.

Gentlemen:—The three 22-inch Lathes you sold us have been set up and running for some time. Their substantial and excellent design is a cause of constant comment. They have proved themselves satisfactory in every way.

Yours truly, B. F. STURTEVANT.

Office of Dennis Long & Co.

Niles Tool Works, Hamilton, O. LOUISVILLE, KY., Oct. 14, 1890.

Gentlemen:—Replying to your favor of the 13th inst., we have in use since 1888 the 60-inch Lathe furnished by you, and we take pleasure in writing that it has given entire satisfaction during the entire time, and we consider it an excellent tool.

Yours respectfully,

DENNIS LONG & CO.

Office of T. M. Nagle.

Niles Tool Works, Hamilton, O. ERIE, PA., Oct. 16, 1890.

Gentlemen:—The 42-inch Swing Lathe purchased of you several years ago, as also the 30-inch Lathe purchased of you about one year ago, are both most excellent tools, and as good as any I have in the works. Wishing you continued success, I remain,

Yours truly, T. M. NAGLE.

The Ashton Valve Co.

Niles Tool Works, Hamilton, O. BOSTON, MASS., Oct. 16, 1890.

Gentlemen:—Replying to your letter of the 14th, asking what our experience is with your new 30-inch Lathe, we will say that it fills our requirements and all demands we could expect. We are perfectly satisfied with it, and know of no better machine that could do the work.

Very truly yours,

THE ASHTON VALVE CO.,
H. G. ASHTON, General Manager.

Eagle Iron Works.

Niles Tool Works, Hamilton, O. DETROIT, MICH., June 9, 1890.

Gentlemen:—Replying to your favor of the 7th, the 48-inch Engine Lathe which you furnished us two years ago has been in constant use since starting, and we are well satisfied with it. It is substantially constructed in every particular, and has been pronounced an excellent tool by everyone who has seen it. Although we w— re favorable prices by other manufacturers, we considered yours with th— re well pleased with our investment.

WORKS,
O'HARA, Secretary.

Lidgerwood Manufacturing Co.

Niles Tool Works, Hamilton, O. NEW YORK, Aug. 26, 1890.

Gentlemen:—In response to yours of the 20th, we beg to reply that the 72-inch Engine Lathe we bought of you some two or more years ago is giving us perfect satisfaction in every particular.

Respectfully yours,
LIDGERWOOD MANUFACTURING CO.

Bellaire Nail Works.

Niles Tool Works, Hamilton, O. BELLAIRE, O., June 7, 1889.

Gentlemen:—Replying to your favor of the 6th inst., the 30-inch Engine Lathe which we bought from you has been in operation for the past six months and has given entire satisfaction. It is easy to handle, correct in screw cutting, true in turning, strong and substantial. It has never given us any trouble, every part being well fitted up in good and workmanlike manner.

Yours respectfully,
BELLAIRE NAIL WORKS.

The Harlan & Hollingsworth Co.

Niles Tool Works, Hamilton, O. WILMINGTON, DEL., Oct. 24, 1890.

Gentlemen:—In reply to your favor inquiring about the 42-inch Lathe you furnished us last year, we take pleasure in stating that it has given us entire satisfaction. It is rigid and strong, is accurately made, and is so arranged that it is as handy to operate as a 20-inch Lathe. We will be glad to show it to any of your customers at any time.

Yours truly,
THE HARLAN & HOLLINGSWORTH CO.,
A. G. WILSON, Supt. Machinery Dep't.

Louisville and Nashville Railroad Co.

Niles Tool Works, Hamilton, O. NEW DECATUR, ALA., Oct. 31, 1890.

Gentlemen:—Replying to yours of the 27th inst., I will say that we purchased of your company, about one year ago, three Lathes and one 18-inch Shaping Machine. Since that time they have been in almost constant use and have given most approved satisfaction, turning out more work with less expense for labor and cost of repairs than any tools of their description in these shops. It is with much pleasure that I recommend machines made by the Niles Tool Works.

Yours very truly, A. BECKERT,
General Master Mechanic.

Office of J. P. Witherow.

Niles Tool Works, Hamilton, O. NEW CASTLE, PA., Oct. 15, 1890.

Gentlemen:—In answer to your inquiry of the 13th inst., will say that the 50-inch Forge Lathe which you furnished us has been in our shop for eighteen months, doing constant duty, double time, and is giving us entire satisfaction. We consider it a "perfect tool," and if our work necessitated an increase of tool capacity we would place the order with you. We wish to state in connection with this that the 16-foot Bending Rolls, 26-inch Lathes, and large Boring, Milling and Drilling Machine are all doing better work than we expected.

Yours truly,
JAMES P. WITHEROW,
H. S. PELL, Superintendent.

Struthers, Wells & Co.

Niles Tool Works, Hamilton, O. WARREN, PA., Jan. 19, 1891.

Gentlemen:—Referring to your favor of the 16th inst., we have had an entirely satisfactory experience with the Lathe bought of you, and are fully satisfied with the tool.

Yours truly,

STRUTHERS, WELLS & CO.
R. F. VAN DOORN, Supt.

The Jackson & Woodin Manufacturing Co.

Niles Tool Works, Hamilton, O. BERWICK, PA., Jan. 19, 1891.

Gentlemen:—Replying to yours of the 16th inst., we beg to say that we have one of your 36-inch Lathes that has been in our machine shop about four years, and has given most perfect satisfaction in every respect. Yours truly, C. H. ZEHNDER,
Vice-Pres't and Gen'l Mgr.

Arctic Ice Machine Manufacturing Co.

Niles Tool Works, Hamilton, O. CLEVELAND, O., Jan. 17, 1891.

Gentlemen:—We take pleasure in stating that the 72-inch Lathe furnished by you for us several years ago has been working to our entire satisfaction, and when in need of other tools will certainly make our first application to you for same.

Very truly yours,

ARCTIC ICE MACHINE MFG. CO.

Erie Forge Company (Limited).

Niles Tool Works, Hamilton, O. ERIE, PA., Jan. 19, 1891.

Gentlemen:—In reply to your inquiry of the 16th inst., relative to the working of the 42-inch by 16-foot Lathe bought of you some time ago, will say it gives perfect satisfaction in every respect. It has worked without giving us any trouble or expense from the time we first belted it. I consider it the best tool I have ever used.

Yours truly, J. P. HARRINGTON,
Secretary.

Ohio and Mississippi Railway Co.

Niles Tool Works, Hamilton, O. WASHINGTON, IND., Nov. 10, 1890.

Gentlemen:—Referring to yours of October 13th, I would say that last fall this company bought of you a complete equipment of tools for our new shops, and I can cheerfully recommend them to anyone, as these tools have done their work fully up to the capacity which they were recommended to do. Among other tools furnished this company were the following: Double Axle Lathe, Car Wheel Borer, 7-foot Boring and Turning Mill, 18-inch Lathe, 22-inch Lathe, Screw Machine and 16-inch Shaper. Would say we were so well pleased with the tools that we have since given you the order for your large Power Bending Rolls.

Yours very respectfully,

Woodward Iron Company.

Niles Tool Works, Hamilton, O. WOODWARD, ALA., June 11, 1888.

Gentlemen:—Your 42-inch Engine Lathe which has been in use in our machine shop since January, 1886, is a good tool and has given entire satisfaction.

Yours truly, WOODWARD IRON CO.

Ball Engine Company.

Niles Tool Works, Hamilton, O. ERIE, PA., June 11, 1888.

Gentlemen:—Replying to your favor of the 7th, would say that the 42-inch Engine Lathe purchased of you in November, 1886, has been running constantly ever since and doing excellent work. We consider it one of the best tools we have.

Yours truly, BALL ENGINE CO.

Bates Machine Company.

Niles Tool Works, Hamilton, O. JOLIET, ILL., May 17, 1890.

Gentlemen:—The 60x20 Planer, and the 60x28 Lathe, which we purchased of you some time ago, are giving us such excellent satisfaction that we feel disposed to express our opinion of them. We have had them in constant use ever since receiving them, and have had no trouble with them whatever. The Planer, while it is very large and heavy, we find works on small work equally as well as on large, and on a great many pieces of small work which could be handled on the 26-inch Planer, we find we can get better and quicker results by doing them on the large Planer. The worm gear on the large Planer is the best plan we know of for obtaining quick and easy reversing motion. The Lathe is equal to the Planer in all respects, and we consider the tools first-class, and would not hesitate to recommend and show them to anyone so desiring.

Yours truly,

BATES MACHINE CO.,
A. J. BATES, Secretary.

REFERENCES.

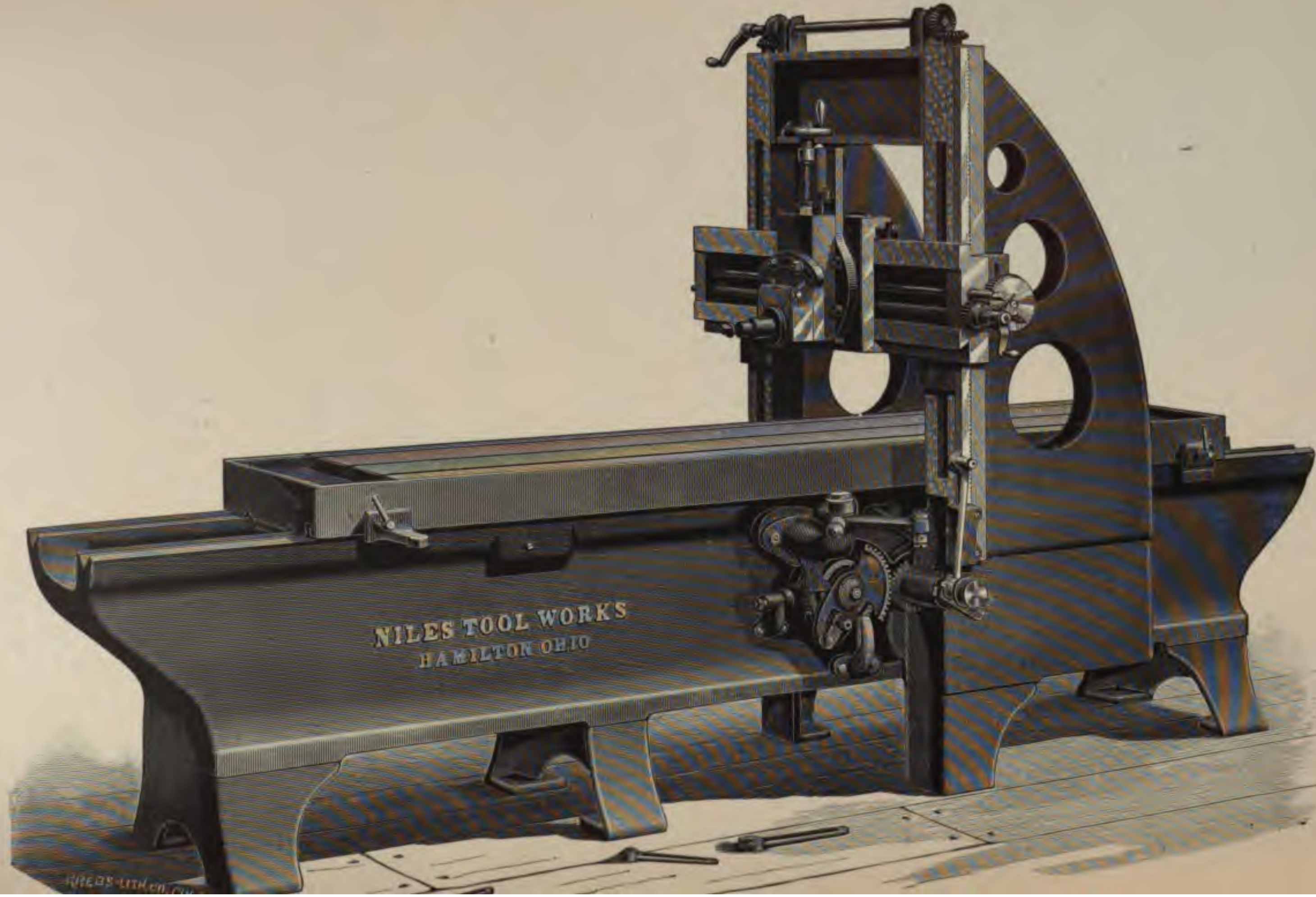
Hooven, Owens & Rentschler Co., Hamilton, O.
Ohio and Mississippi R. R.
Harlan & Hollingsworth Co., Wilmington, Del.
Lehigh Valley R. R.
Illinois Steel Co., Joliet, Ill.
T. M. Nagle, Erie, Pa.
B. F. Sturtevant, Boston, Mass.
Gail, Bumiller & Unzicker, Chicago, Ill.
Addyston Pipe and Steel Co., Cincinnati, O.
Pullman Palace Car Co., Chicago, Ill.
Richmond and Danville R. R.
Flint & Pere Marquette R. R.
Cincinnati, New Orleans and Texas Pacific R. R.
DeLavergne Refrigerating Machine Co., N. Y.
Bass F'dry and Machine W'ks, Ft. Wayne, Ind.
Bethlehem Iron Co., Bethlehem, Pa.
St. Paul, Minneapolis and Manitoba R. R.
Denver and Rio Grande R. R.
East Tennessee, Virginia and Georgia R. R.
Missouri Pacific R. R.
J. P. Witherow, New Castle, Pa.
New York, Chicago and St. Louis R. R.
Norfolk and Western R. R.
Wm. S. Sizer, Buffalo, N. Y.
Duquesne Forge Co., Pittsburg, Pa.
Paige Car Wheel Co., Cleveland, O.
Pennsylvania R. R. Co.
Chesapeake and Ohio R. R.
Ball Engine Co., Erie, Pa.
Atwood & McCaffrey, Pittsburg, Pa.
Ritchie & Dyer Co., Hamilton, O.
Ranken & Fritsch F'dry and Machine Co.
Morgan Engineering Co., Alliance, O.
Lidgerwood Manufacturing Co., N. Y.
Bates Machine Co., Joliet, Ill.

PART IV.

PLANERS.

NILES TOOL WORKS,

HAMILTON, OHIO.


NILES TOOL WORKS
HAMILTON OHIO

PART IV.

PLANERS.

GENERAL DESCRIPTION.

OUR planers are driven by worm gearing so arranged as to obtain the highest efficiency with a moderate velocity of the worm.

The worm runs constantly in oil.

More net power is developed than in a train of spur gearing. This has been repeatedly demonstrated, and can be shown to be true by any test that may be applied.

Our method of construction—the result of twenty years' experience—has so perfected same that the wear is less than in any other method of driving.

We fully guarantee these machines. The value of a tool is its capacity for work, both quantity and quality. We challenge comparison in these respects.

The driving shaft is placed in line with the bed, with the view of setting the machine lengthwise of the shop, parallel with the line shaft.

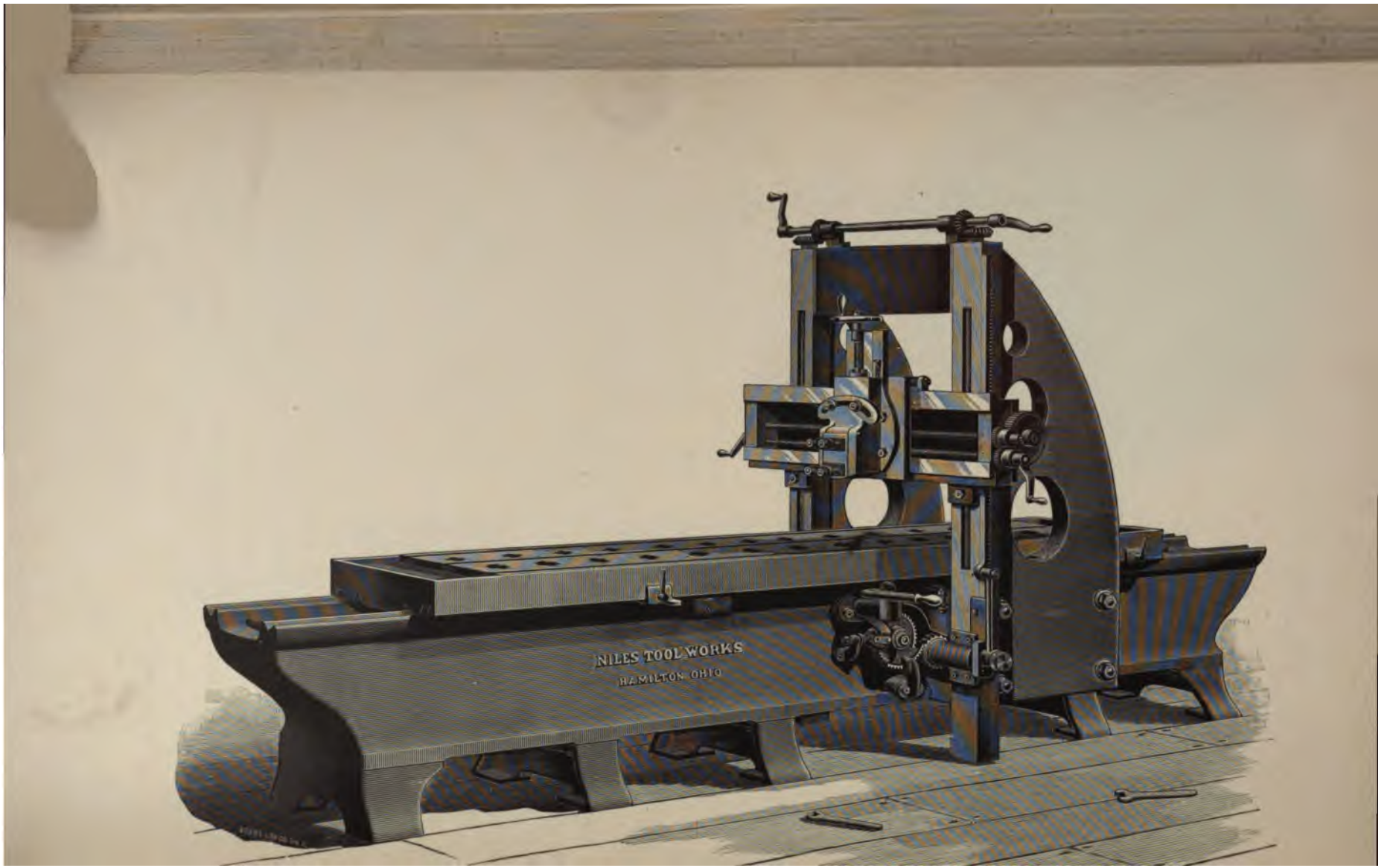
The table reverses accurately and without shock or jar. On all sizes below 48 inches the table reverses at a speed of 4 to 1.

All the gearing and rack teeth are accurately cut from the solid.

The shafts are steel forgings of large diameter, with large and long bearings. The driving shaft runs in bearings of best wearing composition of copper and tin.

The driving pulleys are of large diameter, exercise great power and allow the table to be reversed in a very short distance.

The belts are shifted by our patent automatic belt shifter, which transfers but one belt at a time, preventing two belts running in opposite directions from being on the tight pulley at the same time. It is entirely disconnected from the feeding apparatus, therefore works easily and gives the operator quick and easy control over the motion of the table without using the countershaft shipper.


NILES TOOL WORKS
HAMILTON OHIO

The driving pulleys and gearing are placed on the side of the machine opposite the operator, being entirely out of the way but still completely under his control when standing in his usual position.

The loose pulleys are bushed with brass.

The bed is thoroughly braced by box girders throughout its entire length. Between the housings it is tied together in box form, making it particularly stiff at the point of greatest strain.

The housings extend well back; are of the box form; are strongly braced and rigidly secured to the bed.

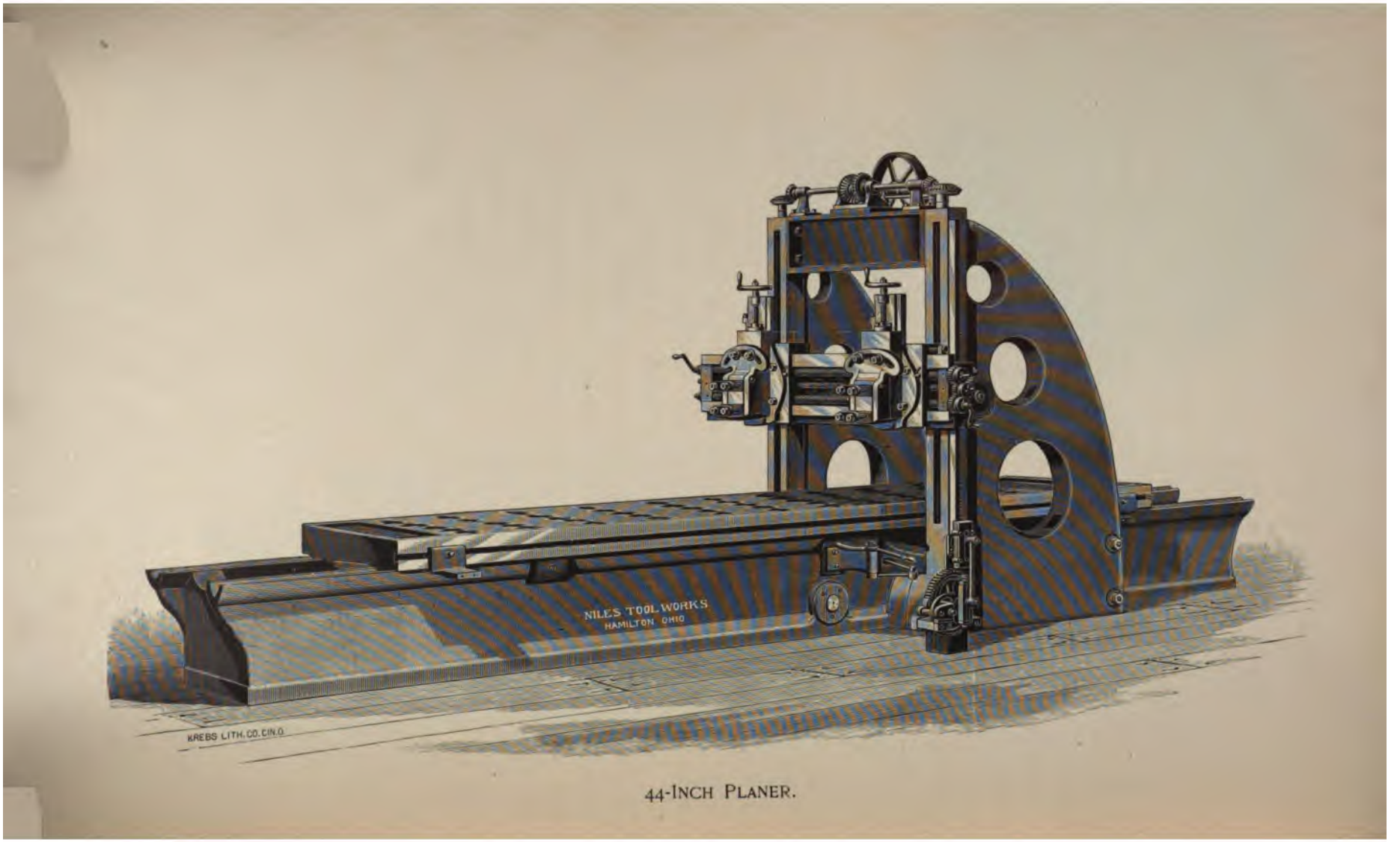
The cross rail is cored out in the form of a box girder, and is very deep and stiff. When two saddles are used the cross rail is extended so that one head can be run over entirely out of the way, and the other head have sufficient traverse to plane off the entire width of the machine.

The top brace is also very deep and stiff, and rigidly secured to the housings.

The amount of metal is ample and is so distributed as to give rigidity and durability under severe service.

The feeds are automatic in all directions. They are operated by our patented feeding device, which renders them absolutely POSITIVE. There is no friction to slip or stick. This feeding device, the result of long experiment, is especially valuable with quick-return planers, and when the machine is equipped with several heads, as then the inertia, due to heavy weights and large fractional surfaces, must be overcome in a very short period of time. ANY friction feeding device which is powerful enough to move four heads over a wide finishing cut, under such conditions, is attended with a great loss of power during the time it is inoperative.

The table is very stiff. The V's are wide apart and large. Table is oiled automatically by counterbalanced rollers in the bed.



44-Inch Planer.

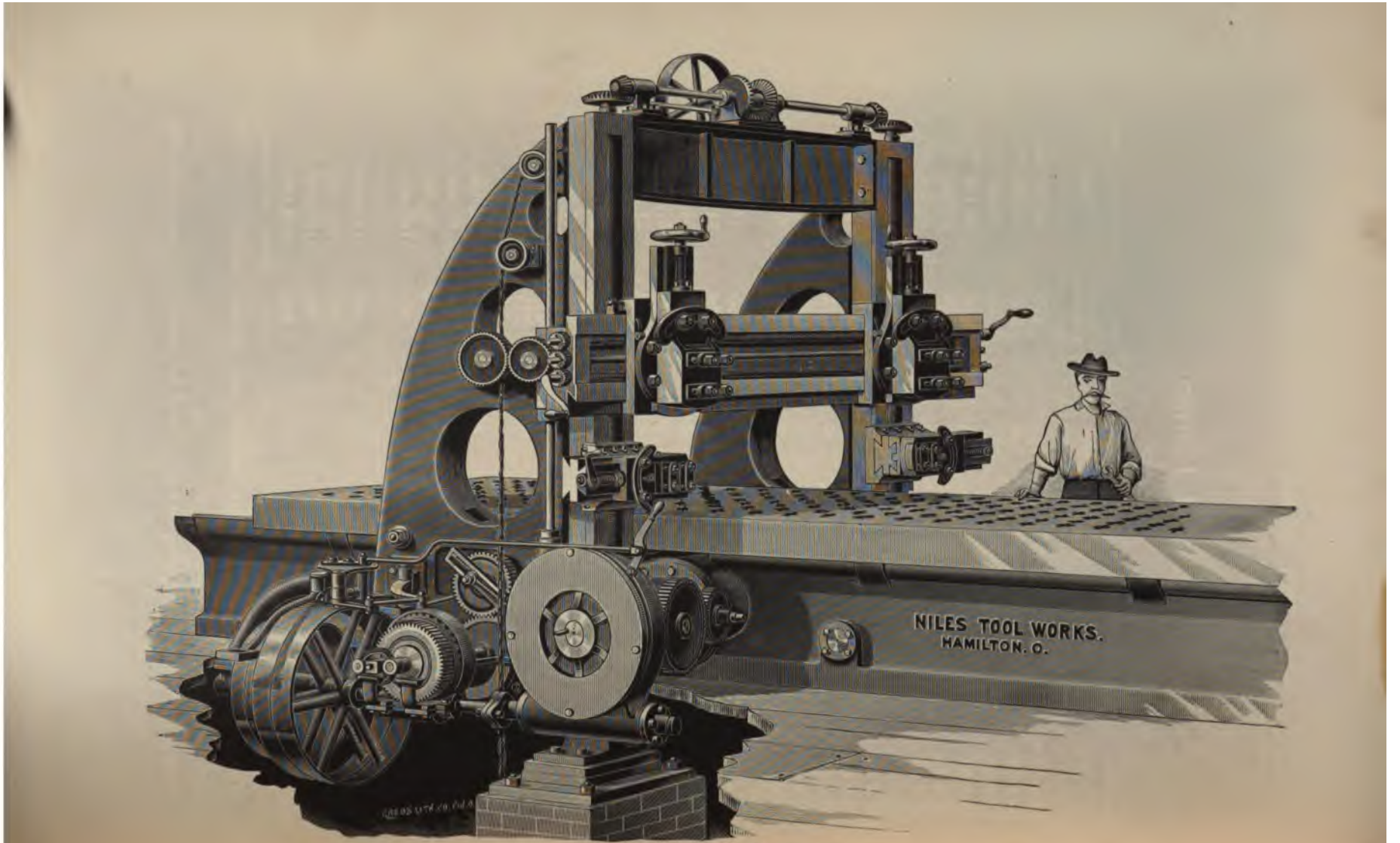
List of Sizes.

We have the following sizes in stock or under way at all times, and can make quick deliveries.

Size.	Length of Table.	Diameter Counter Pulleys	Width of Face	No. of Revolutions.	Weight.
26 x 26 inches.	6 feet.	16 inches.	4 inches.	250	7,000 lbs.
26 x 26 "	7 "	16 "	4 "	250	7,500 "
26 x 26 "	8 "	16 "	4 "	250	8,000 "
26 x 26 "	10 "	16 "	4 "	250	9,000 "
32 x 32 "	6 "	20 "	5 "	200	11,000 "
32 x 32 "	8 "	20 "	5 "	200	12,200 "
32 x 32 "	10 "	20 "	5 "	200	13,400 "
32 x 32 "	12 "	20 "	5 "	200	14,600 "
32 x 32 "	14 "	20 "	5 "	200	16,000 "
38 x 38 "	8 "	18 "	4½ "	225	16,000 "
38 x 38 "	10 "	18 "	4½ "	225	18,000 "
38 x 38 "	12 "	18 "	4½ "	225	20,000 "
38 x 38 "	14 "	18 "	4½ "	225	22,000 "
38 x 38 "	16 "	18 "	4½ "	225	24,000 "
44 x 44 "	10 "	22 "	5 "	190	23,500 "
44 x 44 "	12 "	22 "	5 "	190	25,700 "
44 x 44 "	14 "	22 "	5 "	190	28,000 "
44 x 44 "	16 "	22 "	5 "	190	31,000 "
44 x 44 "	18 "	22 "	5 "	190	34,000 "
48 x 48 "	10 "	20 "	5½ "	240	28,000 "
48 x 48 "	12 "	20 "	5½ "	240	30,400 "
48 x 48 "	14 "	20 "	5½ "	240	33,000 "
48 x 48 "	16 "	20 "	5½ "	240	36,000 "
48 x 48 "	18 "	20 "	5½ "	240	39,000 "
48 x 48 "	20 "	20 "	5½ "	240	42,000 "

Planers can be furnished with one or two heads on cross rail, side heads on one or both housings. Side heads have power feeds.

Cross rail of all sizes above 32-inch raises by power.



72-INCH PLANING MACHINE.

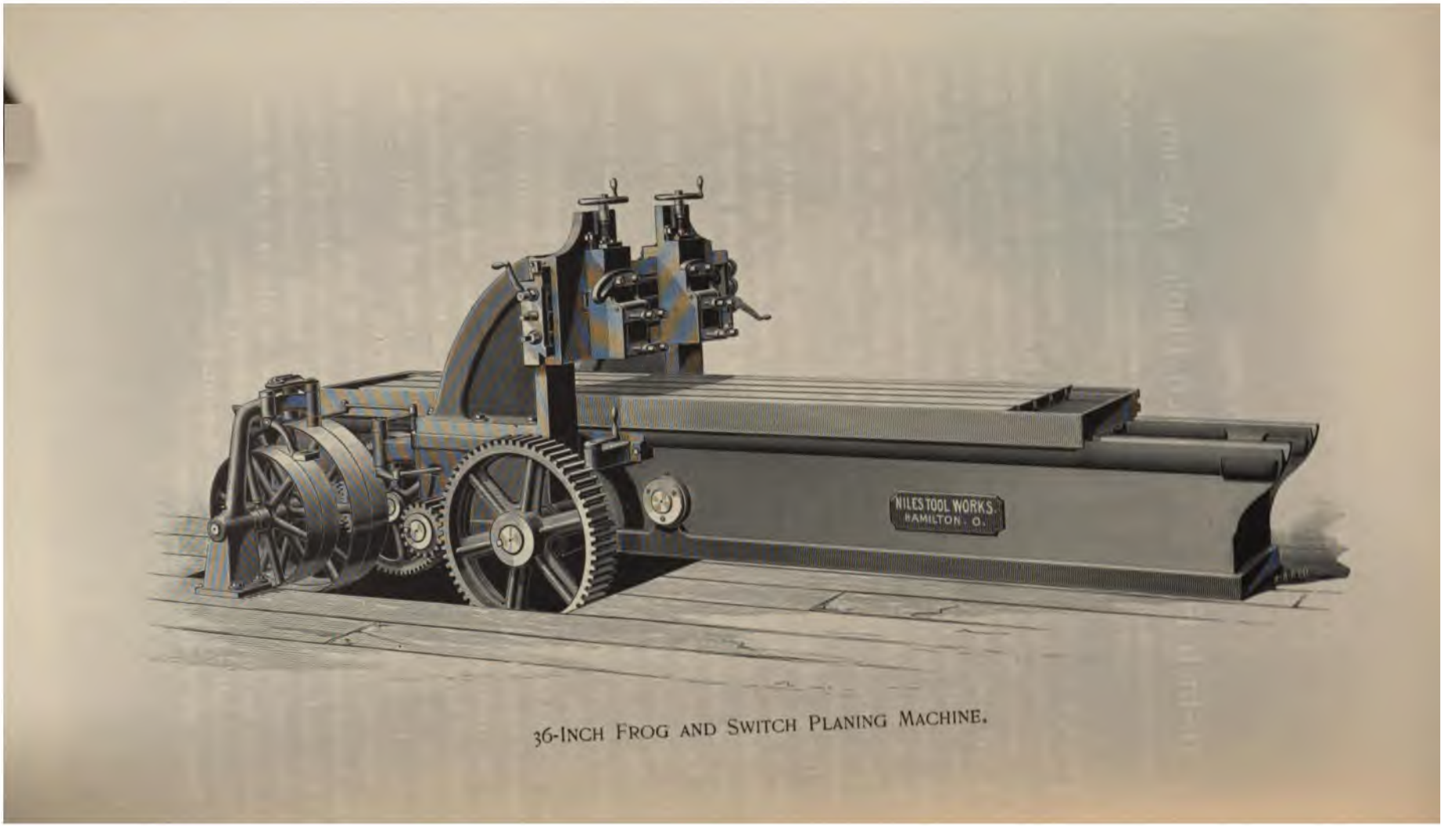
List of Planers.

LARGE SIZES.

Size.	Length of Table.	Diameter Counter Pulleys.	Width of Face.	No. of Revolutions.	Weight.
54 x 54 inches.	10 feet.	20 inches.	5½ inches.	240	32,000 lbs.
54 x 54 "	12 "	20 "	5½ "	240	34,700 "
54 x 54 "	14 "	20 "	5½ "	240	37,400 "
54 x 54 "	16 "	20 "	5½ "	240	40,100 "
54 x 54 "	18 "	20 "	5½ "	240	42,800 "
54 x 54 "	20 "	20 "	5½ "	240	45,500 "
60 x 60 "	12 "	24 "	6 "	215	40,000 "
60 x 60 "	14 "	24 "	6 "	215	43,000 "
60 x 60 "	16 "	24 "	6 "	215	46,000 "
60 x 60 "	18 "	24 "	6 "	215	49,000 "
60 x 60 "	20 "	24 "	6 "	215	52,000 "
72 x 72 "	12 "	22 "	6 "	250	48,000 "
72 x 72 "	14 "	22 "	6 "	250	51,300 "
72 x 72 "	16 "	22 "	6 "	250	54,600 "
72 x 72 "	18 "	22 "	6 "	250	57,900 "
72 x 72 "	20 "	22 "	6 "	250	61,200 "
84 x 84 "	16 "	22 "	6 "	275	64,000 "
84 x 84 "	18 "	22 "	6 "	275	67,800 "
84 x 84 "	20 "	22 "	6 "	275	71,600 "
84 x 84 "	24 "	22 "	6 "	275	79,200 "
96 x 96 "	16 "	22 "	6 "	260	82,000 "
96 x 96 "	18 "	22 "	6 "	260	87,000 "
96 x 96 "	20 "	22 "	6 "	260	92,000 "
96 x 96 "	24 "	22 "	6 "	260	102,000 "
120 x 120 "	16 "	32 "	7 "	185	125,000 "
120 x 120 "	18 "	32 "	7 "	185	131,000 "
120 x 120 "	20 "	32 "	7 "	185	137,000 "
120 x 120 "	24 "	32 "	7 "	185	143,000 "

These Planers are of immense weight and power, designed for the heaviest duty.

Photographs, full description, and prices will be furnished upon application.



36-Inch Frog and Switch Planing Machine.

SPECIAL PLANERS.

36-Inch Frog and Switch Planing Machine.

TO PLANE 36 INCHES WIDE BY 36 INCHES HIGH. WITH ADJUSTABLE CROSS RAIL. OR, TO PLANE 36 INCHES WIDE BY 12 INCHES HIGH, WITH FIXED CROSS RAIL.

THE special features of this machine are its immense weight and power. The duty required is very heavy, and Planers as ordinarily constructed have neither the necessary power to carry the cuts nor the strength to stand the work, and, consequently, when used for this service the cost of the work is very great and the machines themselves soon go to pieces. Our Planer, built specially for this purpose, has enormous power—sufficient to carry two cuts on steel rails, 1½ inches wide, with ⅛-inch feed, and all the parts of the machine are made with a margin of strength to withstand this enormous duty.

Driving pulleys are 36 inches diameter, and run at a speed to give the belts a velocity of 100 to 1 of the table. The driving belt is 4 inches wide, the returning belt 3 inches. The driving belts transmit power through heavy cut gearing.

The rack, bull wheel and pinion are 7½ inches face, 2½ inches pitch. The bull wheel and pinion are of steel.

The driving shafts are heavy steel forgings, running in bushed bearings, which may be easily replaced in case of wear.

The table is made very thick and heavy, running in deep ways in the bed so as to resist the pressure of a side cut. The ways are arranged with improved oilers so as to distribute the oil uniformly.

The cross rail and heads are made of great size and strength. It is desirable to have as few parts as possible so as to avoid lost motion, and hence no swings are employed, the tool boxes being set directly on the saddles. Power cross and vertical feeds are provided.

When this machine is to be used exclusively on rails for switches we make it with low housings, bringing the rail within 12 inches of the table, and it is fixed in one position. If, however, it is desired to use the machine for other work as well, the housings are made to take in work 36 inches square, and the rail raises and lowers as on ordinary planers.

Countershaft pulleys are 20 inches diameter, 6 inches face.

Speed, 280 revolutions per minute.

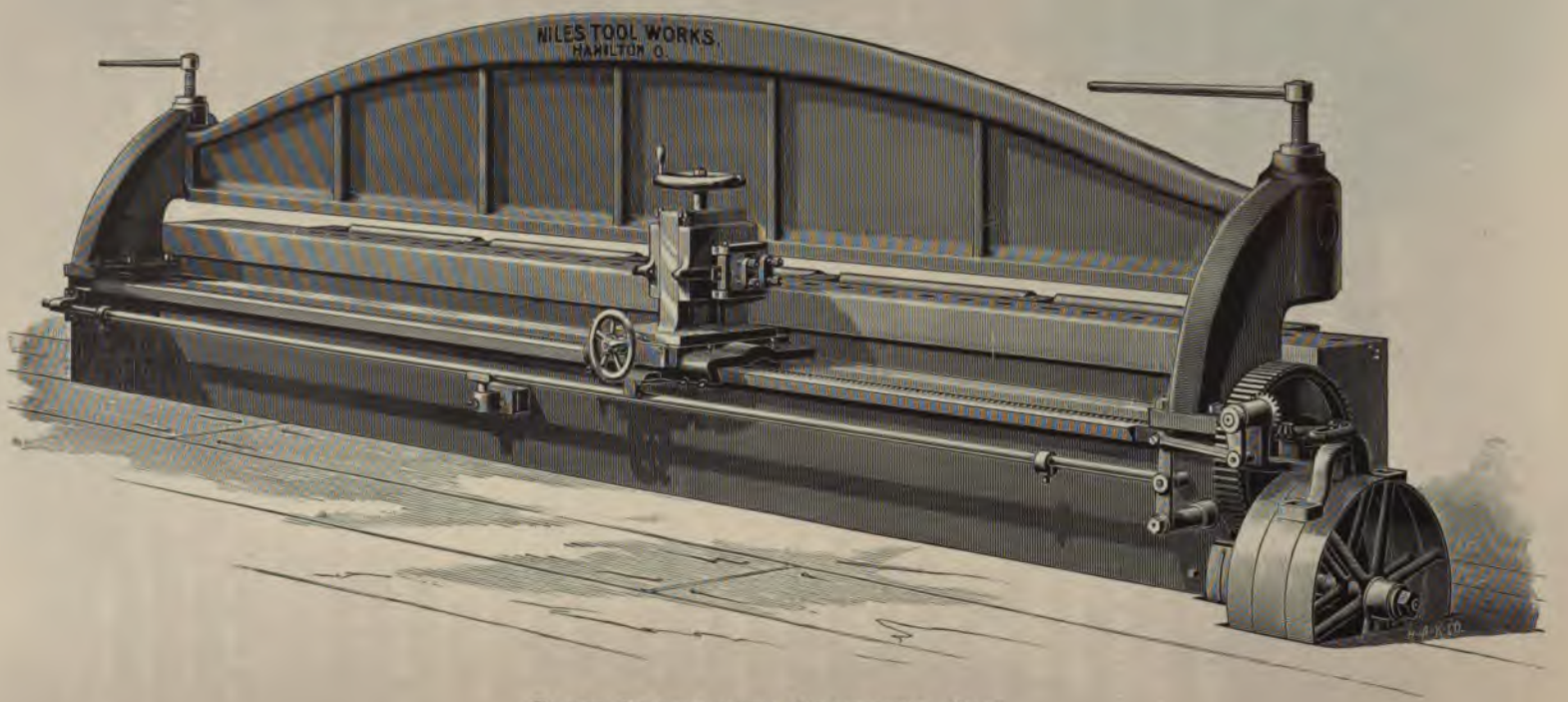


PLATE PLANER WITH COMPOUND REST.

SPECIAL PLANERS.

No. 1 Plate Planing Machine.

WILL PLANE PLATES OF ANY LENGTH.

DESIGNED for planing boiler plates. Will bevel the edge and square up a narrow caulking surface.

This machine will do much better work than can be done by hand, and in much less time, and consequently at much less cost.

The work when done has a smooth, even and true finish. This machine will plane plates 14 to 18 feet long at one setting, and is arranged to plane any length by re-setting the sheet.

There are two separate tools on the tool post, arranged for easy and independent adjustment. The cut is taken both forward and back, so that no time is lost in reversing. A large steel screw operates the saddle.

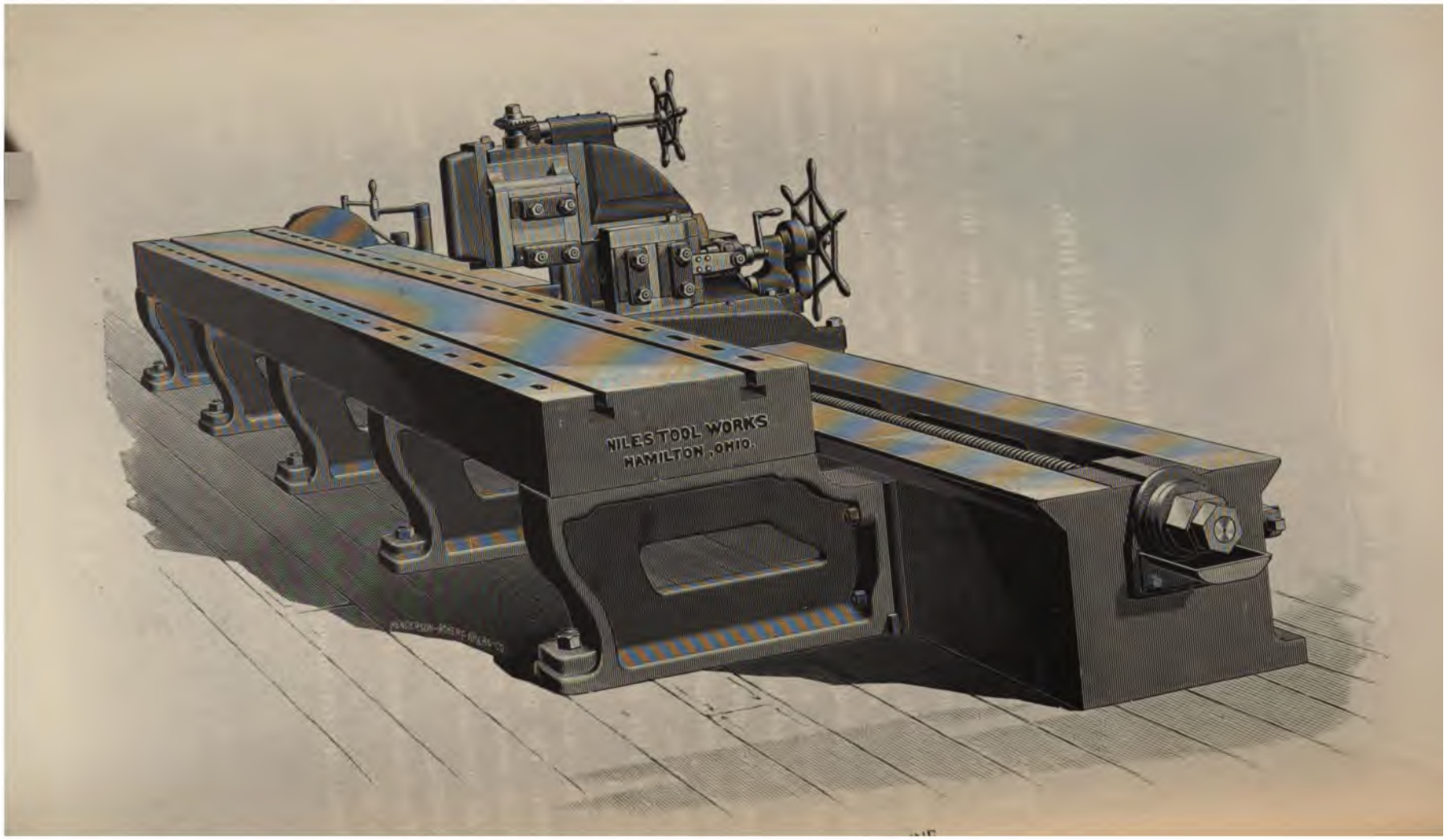
Brackets extend out from the back of the bed carrying rollers for supporting the sheet and facilitating handling. A heavy clamping bar holds the plate securely in position. The bar is raised and lowered by screws at each end. No intermediate screws are required, hence the operation of setting is quickly accomplished.

The machine illustrated is of great strength and power. The driving pulleys are 24 inches diameter for a 2½-inch belt, and strongly geared to the screw. The screw is of steel, 3½ inches diameter, 2 inches pitch, and is supported in a continuous bearing, preventing sag or deflection, so injurious to both screw and nut. The nut is of extra length and surrounds three-fourths the diameter of the screw, giving ample wearing surface.

The countershaft pulleys are 24 inches diameter, 3¾ inches face.

Speed, 300 revolutions per minute.

The machine as illustrated is arranged with a compound tool rest for planing lap-joint work, as required by safe and vault makers. This feature is only furnished on special order. Ordinarily the machine is furnished with an inclined rest only.


NILES TOOL WORKS
HAMILTON, OHIO

SPECIAL PLANERS.

No. 4 Plate Planing Machine.

FOR PLANING SHIP AND BOILER PLATES.

THIS machine will plane plate iron up to 2 inches thick and 20 feet long at one setting.

The tool carriage is driven by a heavy steel screw 4¼ inches diameter, working in a bronze nut 18 inches long. The carriage has a bearing on the bed 28 inches wide by 56 inches long. The screw is supported in a long trough in the center of the bed, preventing sag or deflection and keeping it well oiled.

The tool head has two tools for planing the edges and one tool for planing the upper surface of the plate. Each tool has independent adjustment.

The carriage is reversed automatically, and the cut is taken on both strokes.

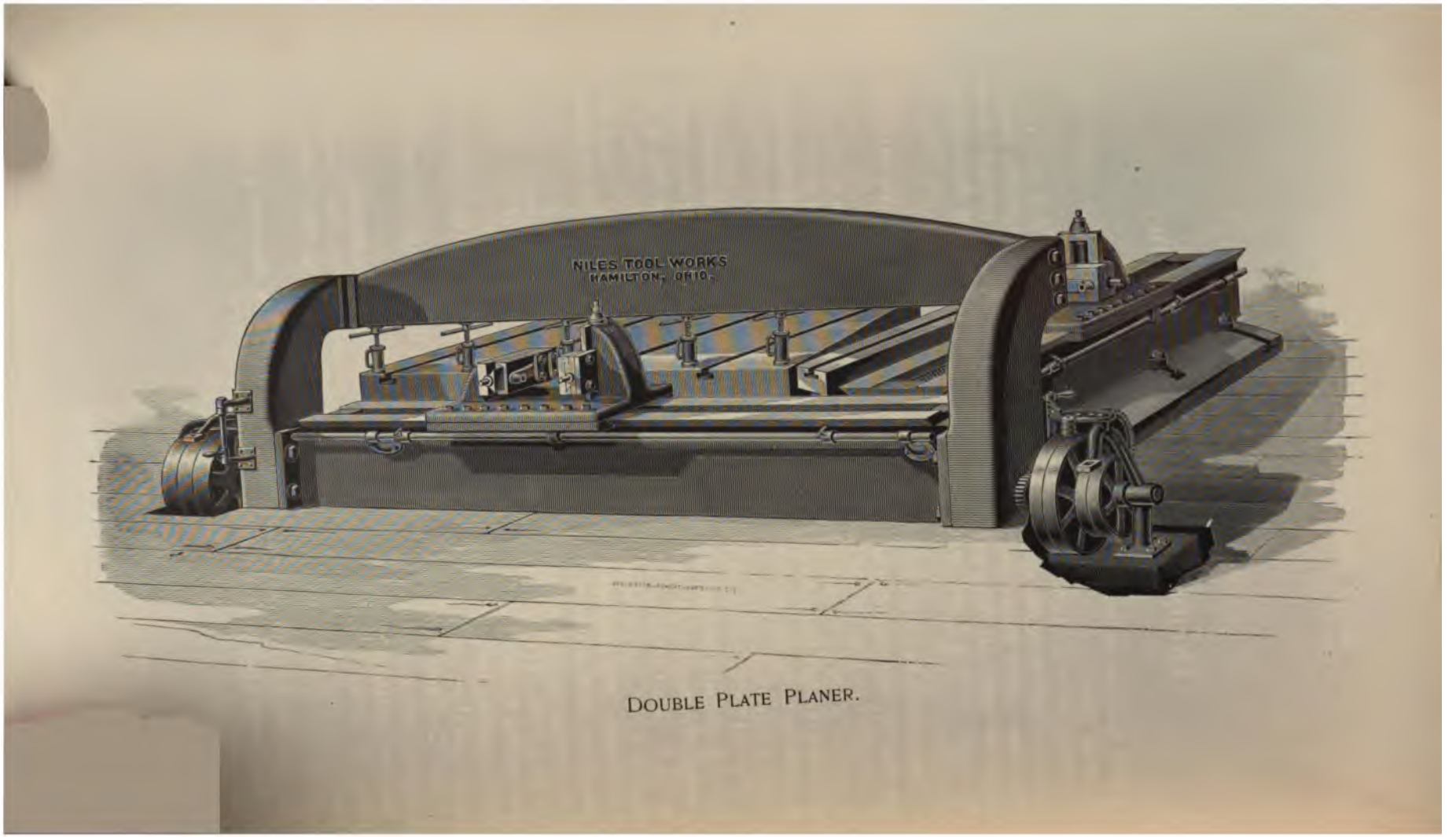
The plate is secured to a substantial table, carried on brackets from the bed.

The entire machine is built in the strongest and most substantial manner. The power of the machine is very great, adapting it to the heaviest service in ship yards and boiler works.

All bearings are of unusual size. Sliding surfaces are carefully fitted by scraping.

The countershaft pulleys are 24 inches diameter, 6 inches face, for a 5-inch belt.

Speed, 240 revolutions per minute.



DOUBLE PLATE PLANER.

Double Plate Planing Machine.

THIS machine is designed to plane on two adjoining edges of plates at the same time.

When plates are to be squared or planed to bevel shapes it is of great convenience to be able to do this at one setting of the plate. In the single plate planers, when work is to be planed on the end, the plate must be set by reference to the edge of the table. If the sheet is long and narrow, and is to be planed to any other angle than 90°, the setting becomes a difficult matter if any degree of precision is required.

These difficulties are obviated by the use of Double Plate Planers, and at the same time the work is performed both quicker and better.

The front, or long side, of this machine is similar in construction to the single machines. It has a tool carriage 54 inches long, driven by a heavy steel screw, and carries two tool heads for cutting in both directions. One of these heads has compound and angular movement, as in ordinary planers, while the other has horizontal movement only.

The end bed is pivoted at the right-hand of the front bed. It is clamped to a heavy T-slotted sole plate, and can be adjusted 10 degrees either way from a right angle by means of a rack and pinion. In this movement the bed carries with it a T-slotted table for holding and clamping the end of the plate. The tool carriage is driven independently in the same manner as the front one. It has one tool head only, with compound and angular adjustment. It cuts in one direction only and has quick return.

The clamping bar is a heavy box girder rigidly secured to box housings bolted to the long bed. The housings are overhanging, so that plates of any length may be planed by resetting.

The clamping bar is placed at sufficient height to clear the end tool slide, and the work is held by screw jacks.

A wide T-slotted table is placed at the back of the machine, suitable for holding large plates without the aid of auxiliary tables.

Each tool carriage is driven and operated independently, except that a safety belt-shipping device is provided, by means of which the front tool carriage reverses the motion of the end carriage whenever there is danger of a collision between them.

Two c[illegible]ts are provided, with pulleys 24 inches diameter, 4 inches face [illegible] volutions per minute.

TESTIMONIALS AND REFERENCES.

TESTIMONIALS.

The DeLavergne Refrigerating Machine Co.

Niles Tool Works, Hamilton, O. NEW YORK, Dec. 30, 1889.

Gentlemen:—Yours of the 26th at hand. In answer would say that if our experience with the number of tools we have already received from you did not convince us that we will have no trouble with the 10-foot Planer, we should certainly want you to send a man to superintend its erection; but we anticipate no trouble whatever. The manner in which your tools go together and start off to their work, as compared to some others we have, is a miracle. We made a mistake in not getting more of your tools and less of other makes. Shall probably order of you a No. 1 Horizontal Mill. Yours very truly, E. V. CLEMENS,
Superintendent.

Johnston Frog and Switch Co.

Niles Tool Works, Hamilton, O. CHESTER, PA., Oct. 25, 1890.

Gentlemen:—Replying to your letter of the 14th inst., in reference to the Switch Planers furnished us, we have been using two of them for more than four years and they have given us entire satisfaction. I would not hesitate to recommend these Planers to anyone in need of a machine of this kind. Yours truly,
JOHNSTON FROG AND SMITCH CO.,
E. H. JOHNSTON, General Manager.

Missouri, Kansas and Texas Railway.

OFFICE OF MASTER MECHANIC,
Niles Tool Works, Hamilton, O. PARSONS, KAN., Oct. 22, 1890.

Gentlemen:—Referring to your valued favor of a recent date, I beg to advise that I am especially well pleased with the 60-inch Planer purchased from your works last year. The machine being heavy, substantial and well proportioned in all its parts, and designed to stand the heaviest class of work, has given entire satisfaction and I take pleasure in so advising you.
Yours truly, WM. O'HERIN,
Master Mechanic.

Bass Foundry and Machine Works.

Niles Tool Works, Hamilton, O. FT. WAYNE, IND., May 1, 1890.

Gentlemen:—We take pleasure in testifying to the merits of the new machinery we purchased of you some time since—particularly the 8x8-foot Planer and the 16-foot Boring and Turning Mill, both of which are exceptionally good tools and entirely satisfactory to us.

The method of driving the Planer by tangent gearing imparts a very smooth motion to the table, and judging from our experience of eighteen months—during which time the machine has been in constant use—we see no reason to question its durability. We have made a number of special machines ourselves driven in this manner, and our conclusion is that when properly proportioned and constructed, tangent gearing is a very excellent and durable method of driving.

Very respectfully,
BASS FOUNDRY AND MACHINE WORKS,
J. H. BASS, President.

Ajax Forge Co.

Niles Tool Works, Hamilton, O. CHICAGO, ILL., Oct. 8, 1890.

Gentlemen:—We are very much pleased at the results derived from the use of your Switch Planers, which we have had in service for the last four years—a sufficient length of time to test their merits. We consider them the best make of Planers we have in our works.

Very truly yours, AJAX FORGE CO.,
R. ORTMANN, Sec'y and Gen'l Mgr.

The Minnesota Iron Car Co.

Niles Tool Works, Hamilton, O. DULUTH, MINN., Oct. 16, 1890.

Gentlemen:—Replying to your favor of the 13th inst., we take pleasure in saying that the 32-inch Planer furnished us by you, like all the other tools you have sold us, gives entire satisfaction. Yours truly, WM. E. TANNER,
Vice-President.

Office of C. & G. Cooper & Co.

Niles Tool Works, Hamilton, O. MT. VERNON, O., Oct. 15, 1890.

Gentlemen:—Answering yours of the 13th asking us how we are pleased with the 84-inch Planer we purchased of you last year, we would say that it has given us the best of satisfaction, and that we consider it a first-class tool. You are aware that we have placed orders with you this year for other large tools. We did this on the strength of the satisfaction we were getting from the tools we had bought of you before.

Very truly yours,
C. AND G. COOPER & CO.

The Weir Frog Co.

Niles Tool Works, Hamilton, O. CINCINNATI, O., Feb. 27, 1889.

Gentlemen:—Your favor of the 23d, requesting statement of our experience in the use of your 36-inch Switch and Frog Planers, has been received. Replying thereto I take pleasure in stating that we have had one of them in use three years and seven months, during which time it has given excellent satisfaction. We regard it as the most efficient, powerful and best-running Switch Planer on the market to-day. Our second Planer of the same kind, which we have had in use for about two years, is doing equally as well as the first, giving excellent satisfaction.

Very truly yours, FRED C. WEIR,
President.

The Missouri Pacific Railway Co.

LOCOMOTIVE DEPARTMENT,
Niles Tool Works, Hamilton, O. ST. LOUIS, MO., Feb. 24, 1889.

Gentlemen:—Replying to yours of the 23d inst., relative to the special Planer for frog and switch work, allow me to say that some five years ago we felt the need of a special tool for planing rails used in split switches, and after due consideration of what was required an order was placed with you for this tool. I am free to say that this tool has, and is, doing excellent service, planing two rails at one and the same time, reducing flange and head of rail at one cut. It has proven to be one of, if not the best machine for the purpose I have seen, and would recommend it to any one needing such a tool. We have since put in more of [illegible] and many other tools of your make. All are doing good work. Hoping t[illegible]

I remain, Yours truly,

The Globe Iron Works Co.

Niles Tool Works, Hamilton, O. CLEVELAND, O., June 8, 1890.

Gentlemen:—Replying to your favor of the 6th inst., we have to say that the Plate Planing Machine purchased of you is giving perfect satisfaction, and we are very much pleased with it.

Very truly yours,
THE GLOBE IRON WORKS CO.,
LUTHER ALLEN, Secretary.

Cincinnati, Wabash and Michigan Railway.

MOTIVE POWER DEPARTMENT
Niles Tool Works, Hamilton, O. WABASH, IND., Oct. 22, 1890.

Gentlemen:—I beg to inform you that the 38x38-inch 12-foot Planer this company purchased from you some two years ago is giving entire satisfaction. This is your standard 38-inch Planer, and we are using it successfully on frog and switch work, as well as general work. It is the boss tool.

Very truly, S. B. TINKER,
Master Mechanic.

The Cleveland Ship Building Co.

Niles Tool Works, Hamilton, O. CLEVELAND, O., March 27, 1889.

Gentlemen:—In answer to your inquiry of how we are pleased with the worm system applied to the 8x8 16-foot Planer, we wish to be understood as being greatly pleased with it. The motion is good and there is an entire absence of the usual noise of the other styles. We think this is the handiest Planer of its size we have yet seen, and have no word of complaint to enter against it. It gives us entire satisfaction.

Yours very truly,
THE CLEVELAND SHIP BUILDING CO.
H. D. COFFINBERRY, President.

Harrisburg Car Manufacturing Co.

FOUNDRY AND MACHINE DEPARTMENT,
Niles Tool Works, Hamilton, O. HARRISBURG, PA., March 30, 1889.

Gentlemen:—In reply to your inquiry about the 60-inch Planer you furnished us about six months ago, we are pleased to report it entirely satisfactory in every particular. We have been working it night and day on heavy work, constantly, since December 1st. It stands up to it handsomely, is very massive and powerful, and has done a vast amount of excellent work since we have had it.

Very respectfully yours,
M. E. HERSHEY,
Supt. Foundry and Machine Dept.

The Black & Clawson Co.

Niles Tool Works, Hamilton, O. HAMILTON, O., July 31, 1889.

Gentlemen:—We have in use two of your Planers, a 36x36-inch 12-foot, and a 44x44-inch 12-foot, the latter with a side head. These Planers are both giving excellent satisfaction. They run smoothly under heavy loads and heavy cuts, reverse noiselessly and without shock. They are well built, and much heavier in all their parts than same size Planers of other makes. We can cheerfully endorse all you claim for them.

Yours respectfully,
THE BLACK & CLAWSON CO.,
FRANK BLACK, President.

Office of T. M. Nagle.

Niles Tool Works, Hamilton, O. ERIE, PA., June 8, 1889.

Gentlemen:—The Plate Planing Machine purchased of you about four years ago has been in constant use ever since, and has given me entire satisfaction.

Yours truly, T. M. NAGLE.

Gale Manufacturing Co.

Niles Tool Works, Hamilton, O. ALBION, MICH., Jan. 20, 1891.

Gentlemen:—In answer to yours in regard to our Planer, we can not speak too highly of it. It has given us entire satisfaction. It has never been out of order in the least since the first time we started it, and has been continually at work.

Yours truly,
GALE MANUFACTURING CO.,
E. C. LESTER, Supt.

Lewis Foundry and Machine Co. (Limited).

Niles Tool Works, Hamilton, O. PITTSBURG, PA., Jan. 20, 1891.

Gentlemen:—We acknowledge with pleasure receipt of yours of the 16th. In answer to same would say that the 36x36-inch Planer which we purchased from you in '87 has been in constant service since, does heavy work and plenty of it. So far the cost for repairs has been nothing and the tool is in good condition. The 60-inch Double Head Boring Mill lately bought from you is a first-class tool and is giving us satisfaction.

Very respectfully,
LEWIS FOUNDRY AND MACHINE CO. (Limited).

American Ship Windlass Co.

Niles Tool Works, Hamilton, O. PROVIDENCE, R. I., April 12, 1889.

Gentlemen:—We have now thoroughly tested the Iron Planer, 5x5x16-foot, and the 6-foot Boring and Turning Mill bought of you last year, and find them satisfactory in every respect. Their efficiency has reduced the cost to us of the work that we bought them to do. The design of the machines spoken of shows careful thought and experience as to what is required of such tools. The Horizontal Boring Machine bought of you, standing beside others of same kind, receives the preference by our machinists.

Yours very truly, FRANK S. MANTON,
Agent.

Sheriffs Manufacturing Co.

Niles Tool Works, Hamilton, O. MILWAUKEE, WIS., Jan. 17, 1891.

Gentlemen:—We purchased from you, in 1886, a 60x60-inch 16-foot Niles Planer, which has been almost continuously in use since. The first piece planed on same weighed 25,380 lbs. net. The Planer was belted on Saturday at 3 o'clock, and on Monday morning a piece was placed on same and ran six days without running off of table for oiling ways, which we considered at the time a very severe test for the Planer. There was no sign of cutting whatever. We consider it the best tool made as yet, both as to oiling of table ways and the mode of gearing table to develop power.

Yours truly,
SHERIFFS MANUFACTURING CO.,
T. W. SHERIFFS, Secretary.

Louisville and Nashville Railroad Co.

Niles Tool Works, Hamilton, O. HOWELL, IND., Nov. 26, 1890.

Gentlemen:—In reply to your letter of Oct. 20th, asking me how the new tools are working that your company furnished for the Howell shops over a year ago, I have this to say: They are all giving entire satisfaction. The 32-inch 10-foot Planer is well adapted to all classes of work, the patent gear and quick return making it a very valuable machine. The work turned out by this machine can not be beat, and I consider it one of the best Planers in use. The 5-foot Radial Drill Press is also giving excellent satisfaction. It is adapted to a wide range of work, and if once used cannot be dispensed with. The 14-inch Slotter, the 72-inch Boring Mill and the 30-inch Engine Lathe are all doing excellent work. They have been in steady use over twelve months and have given us no trouble whatever. The workmanship and material used in these tools is the best, and they are well-proportioned, which makes them, in my opinion, the best machines I have used. Yours truly, THOS. WALSH,
Master Mechanic.

The Hooven, Owens & Rentschler Co.

Niles Tool Works, Hamilton, O. HAMILTON, O., April 27, 1889.

Gentlemen:—We have had in constant use for the past five years one of your 48x48-inch 18-foot Planers. Most of the time it has been running night and day and has been crowded to the utmost. We have used it planing Corliss engine frames, under the heaviest loads and the severest strains. It has stood up to its work magnificently, taking heavy cuts, running smoothly and costing nothing for repairs. Some time after purchasing this Planer we put in a 36-inch geared Planer on the score of economy. This Planer can not in any way be compared with the "Niles." It is lacking in power, is very noisy, reverses with a shock almost sufficient to loosen the clamps, and is constantly breaking down. We would have saved the difference in price many times over had we bought a "Niles" Planer. One year ago we put in an 84x84-inch 20-foot "Niles" Planer with four heads. This is doing equally good work. We regard the worm gearing used on your Planers as their best feature, and we believe it is the only way to drive a Planer to get the best results. Yours truly,
THE HOOVEN, OWENS & RENTSCHLER CO.,
J. C. HOOVEN, President.

REFERENCES.

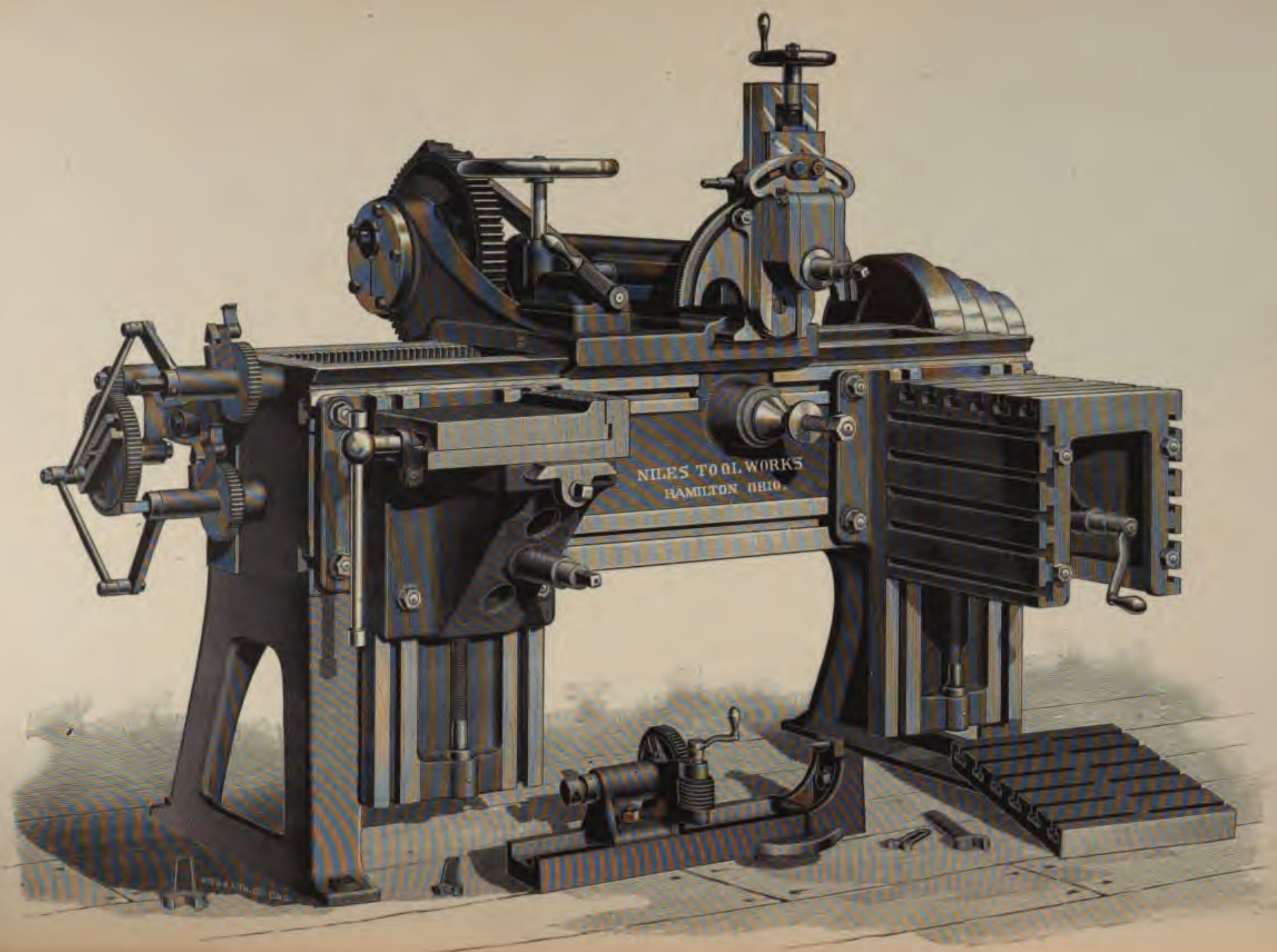
East Tennessee, Virginia and Georgia R. R.
Northern Pacific R. R.
New York, Chicago and St. Louis R. R.
P. H. Griffin, Buffalo, N. Y.
Eagle Iron Works, Detroit, Mich.
Ohio River R. R.
St. Louis, Arkansas and Texas R. R.
Minneapolis, Sault Ste. Marie & Atlantic R. R.
Chicago, St. Louis and Pittsburg R. R.
Lehigh Valley R. R.
Chicago, Rock Island and Pacific R. R.
DeLavergne Refrigerating Machine Co., N. Y.
Harlan & Hollingsworth Co., Wilmington, Del.
Dickson Manufacturing Co., Scranton, Pa.
Chicago, St. Paul, Minneapolis & Omaha R. R.
Hooven, Owens & Rentschler Co., Hamilton, O.
Cleveland Ship Building Co., Cleveland, O.
Bass F'dry and Machine W'ks, Ft. Wayne, Ind.
Ranken & Fritsch F'dry & Mach. Co., St. Louis.
Cleveland City Forge & Iron Co., Clevel'd, O.
Peter Wright & Sons, New York.
Lidgerwood Manufacturing Co., New York.
Long & Allstatter Co., Hamilton, O.
New York Central and Hudson River R. R.
Southern Pacific Company.
Minnesota and Northwestern R. R.
Richmond and Danville R. R.
Joliet Steel Works, Joliet, Ill.
Morgan Engineering Co., Alliance, O.
S. E. Cleaves & Son, Hancock, Mich.
Cincinnati, Wabash and Michigan R. R.
Union Pacific R. R.
Pennsylvania Company.
Louisville and Nashville R. R.
Chesapeake and Ohio R. R.
Iowa Central R. R.
Buffalo, Rochester and
Missouri, Kansas ar
James P. Witherow
Cornell University.

PART V.

SHAPING AND SLOTTING MACHINES.

NILES TOOL WORKS,

HAMILTON, OHIO.


NILES TOOL WORKS
HAMILTON OHIO.

PART V.

Shaping Machines.

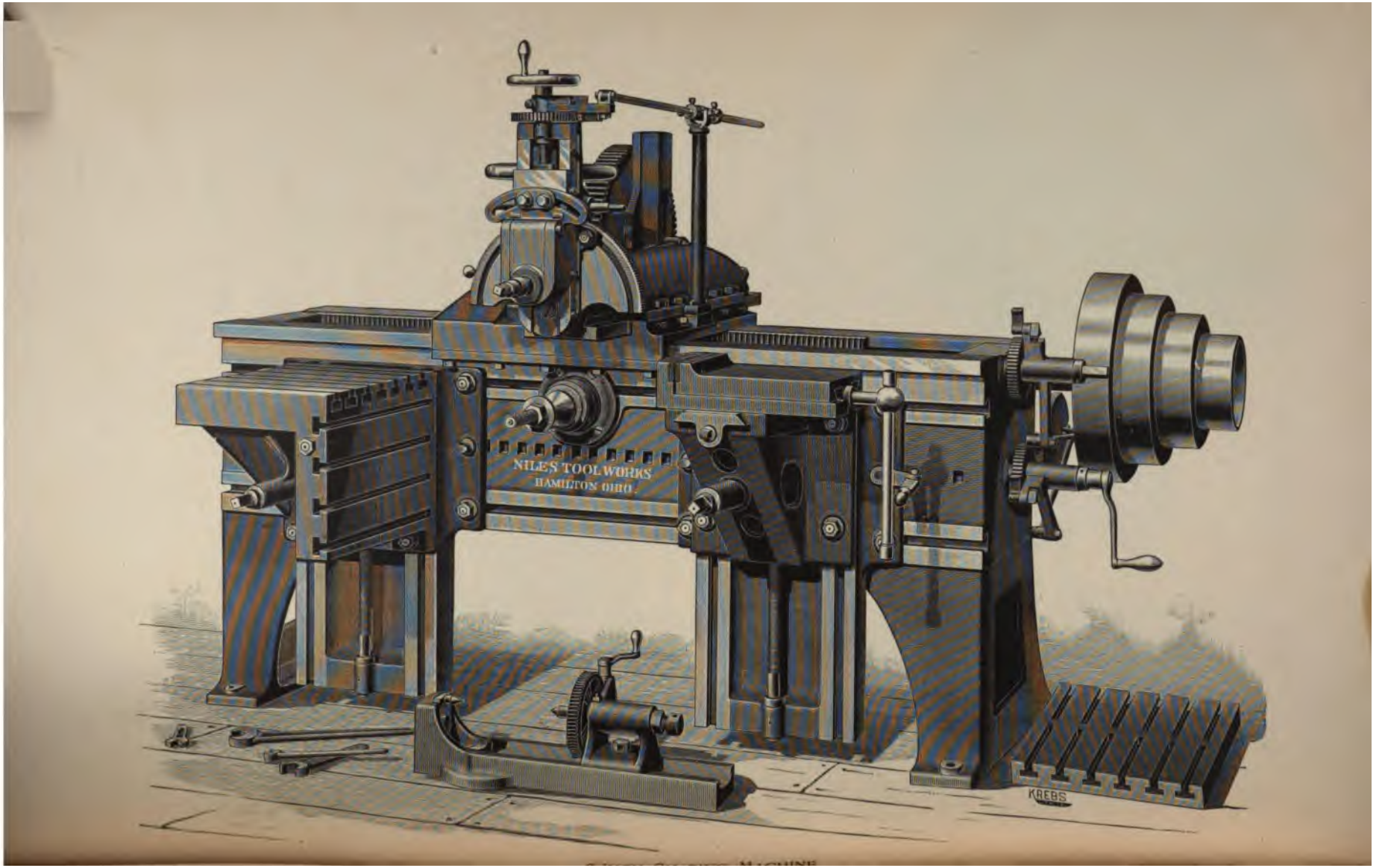
A SHAPING Machine is now considered an indispensable machine in any shop. It is invaluable for a great variety of work, is almost universal in its application, and affords an immense saving in the time and cost of doing work. The style of its construction is such that it requires the most accurate workmanship. Many of these machines are very light and incapable of doing anything but the lightest class of work.

Our machines are all traveling head machines—that is, the saddle carrying the cutter bar is traversed on a bed of considerable length, the cutting tool operating at all points. This type of machine is adapted to a much wider range of work than the Pillar Shaper with stationary head.

The cutter bar is operated with Whitworth quick return. This arrangement, first brought out by Sir Joseph Whitworth, of Manchester, England, is generally recognized as being the best movement for tools of this class. In our machines it is so arranged that the forward or cutting stroke takes about two-thirds of the crank motion, while the return stroke is made during the remaining third. The regulation of the speed of the cutter bar is obtained by large cones for wide belts, so proportioned as to give the right speed for long or short cuts, or different material, and with ample power to do heavy work. On the long stroke machines the driving cones are back geared, giving eight changes of speed. The feeds are cross, down, angular, and circular for convex and concave.

Two tables are furnished with all our machines. On one of them work may be clamped on the top or either side, while the other is arranged to receive a vise, index centers, or a swiveling table. Both these tables have independent elevating screws, which are so geared that they can be easily raised or lowered without stooping. A cone mandrel is also provided for planing such work as hubs of cranks or rocker arms. These machines are necessarily more expensive than machines with stationary heads, but the advantages of this style of construction far overbalance the increased cost.

These machines are built in the following sizes: 16, 20 and 24-inch.


NILES TOOL WORKS
HAMILTON OHIO
KREBS

16-Inch Shaping Machine.

WITH TRAVELING HEAD.

THE cutting bar has 16½ inches stroke and quick-return movement. It is 36 inches long, and has bearing on the saddle plate of 26x7½ inches.

The saddle has a traverse of 48 inches on the bed, which is 6 feet long. Saddle can be quickly moved on bed by rack and pinion.

The feeds are cross, down, angular, and circular for both convex and concave. The first and last are by power, the down and angular feeds by hand.

The two tables have independent elevating screws, and the arrangement is such that they can be raised and lowered without stooping. They have a vertical adjustment of 18 inches.

The machine is supplied with swivel vise, centers, self-feeding cone mandrel for circular work, countershaft, wrenches, etc.

All sliding surfaces are fitted by scraping, no emery being used under any circumstances. All work done in strict conformity with U.S. standard gauges.

The countershaft has tight and loose pulleys 16 inches diameter, 5 inches face. It should run 150 revolutions.

18-Inch Shaping Machine.

WITH TRAVELING HEAD.

THE cutting bar has 18½ inches stroke and quick-return movement. It is 45 inches long, and has bearing on the saddle plate of 29x7¾ inches.

The saddle has 60 inches traverse on the bed, which is 6 feet 10 inches long. It is moved along the bed by rack and pinion.

The driving cone has four steps for a belt 3½ inches wide. The cone steps range in diameter from 22 to 10 inches. Two sets of pulleys are provided on the countershaft, giving it two speeds. We have, therefore, eight changes of speed for the cutting bar.

The feeds are cross, down, angular, and circular for convex or concave work, all operated by power.

The two tables have independent elevating screws, and the arrangement is such that they can be raised or lowered without stooping. They have a vertical adjustment of 18 inches.

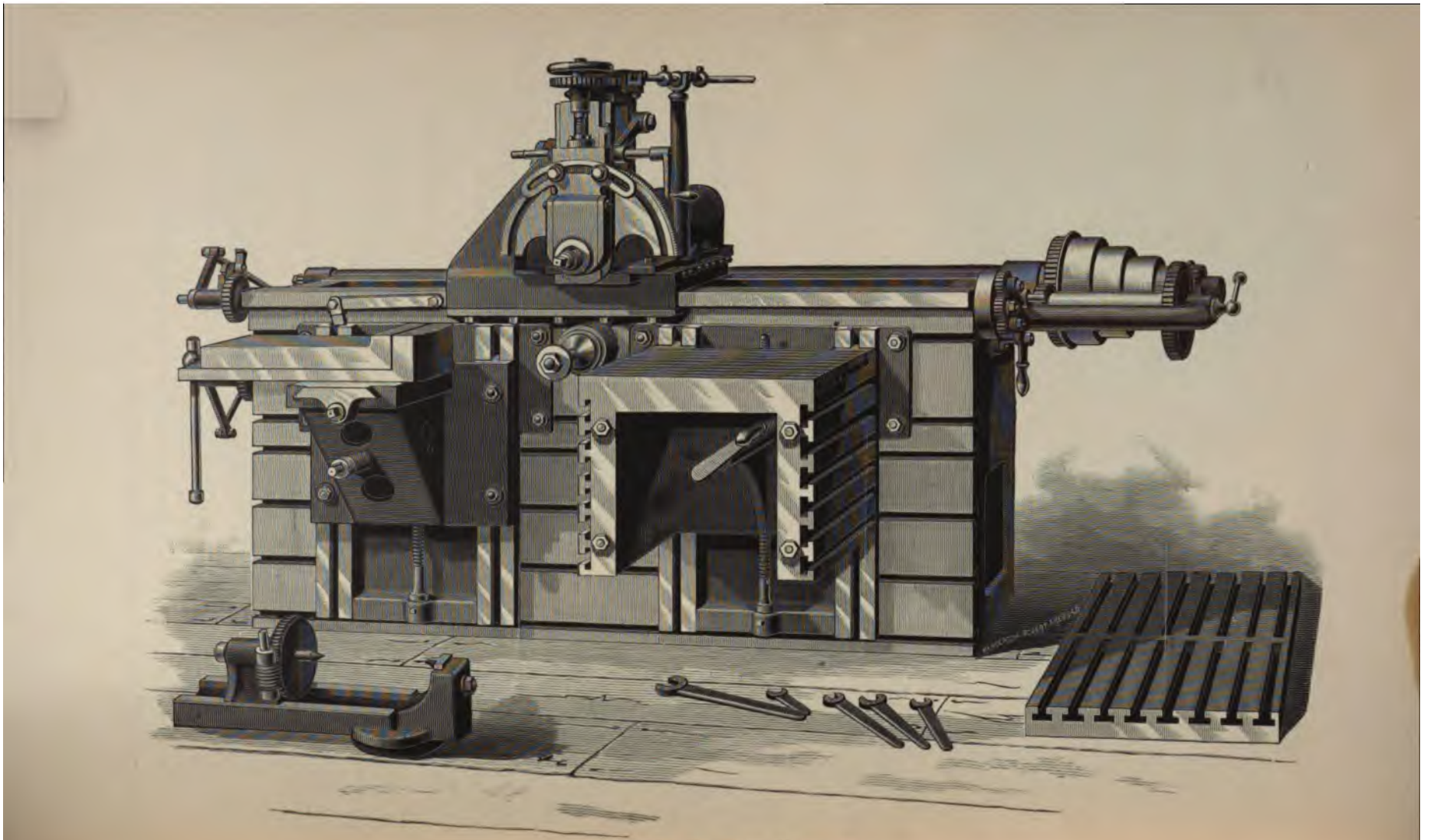
The machine is supplied with swivel vise, centers, self-feeding cone mandrel for circular work, countershaft, wrenches, etc.

All sliding surfaces are fitted by scraping, no emery being used under any circumstances. All work is done in strict conformity with U.S. standard gauges.

The bed is made unusually deep to give a good bearing to the table saddles.

The machine throughout is heavy and powerful.

The countershaft has three pulleys 22 inches d [illegible]. Speeds of countershaft, 90 and 120 revolutions per min[illegible]



24-Inch Shaping Machine.

24-Inch Shaping Machine.

WITH TRAVELING HEAD.

THE cutter bar has 24 inches stroke. It is operated by a variable crank, with Whitworth quick-return motion.

The bed is 8 feet 4 inches long. The saddle has 70 inches traverse on the bed, with quick motion by power.

The cutter bar is 63 inches long, and has a bearing on the saddle of 9x37 inches. The bar has its full bearing at any length of stroke.

The feeds are automatic in all directions, for straight, vertical, angular, and circular or curved work. The head has segment wheel and worm.

The driving cone has four steps, and is strongly back geared, giving eight changes of speed.

A heavy plate, planed true and T-slotted, covers the entire front of the machine.

The tables may readily be removed, and large, unwieldy work bolted fast to the face of the machine.

The tables have a vertical adjustment of 21 inches. They have independent elevating screws, and the arrangement is such that they can be raised or lowered without stooping.

The machine is supplied with swivel vise, centers, two tables, self-feeding cone mandrel for circular work, countershaft, wrenches, etc.

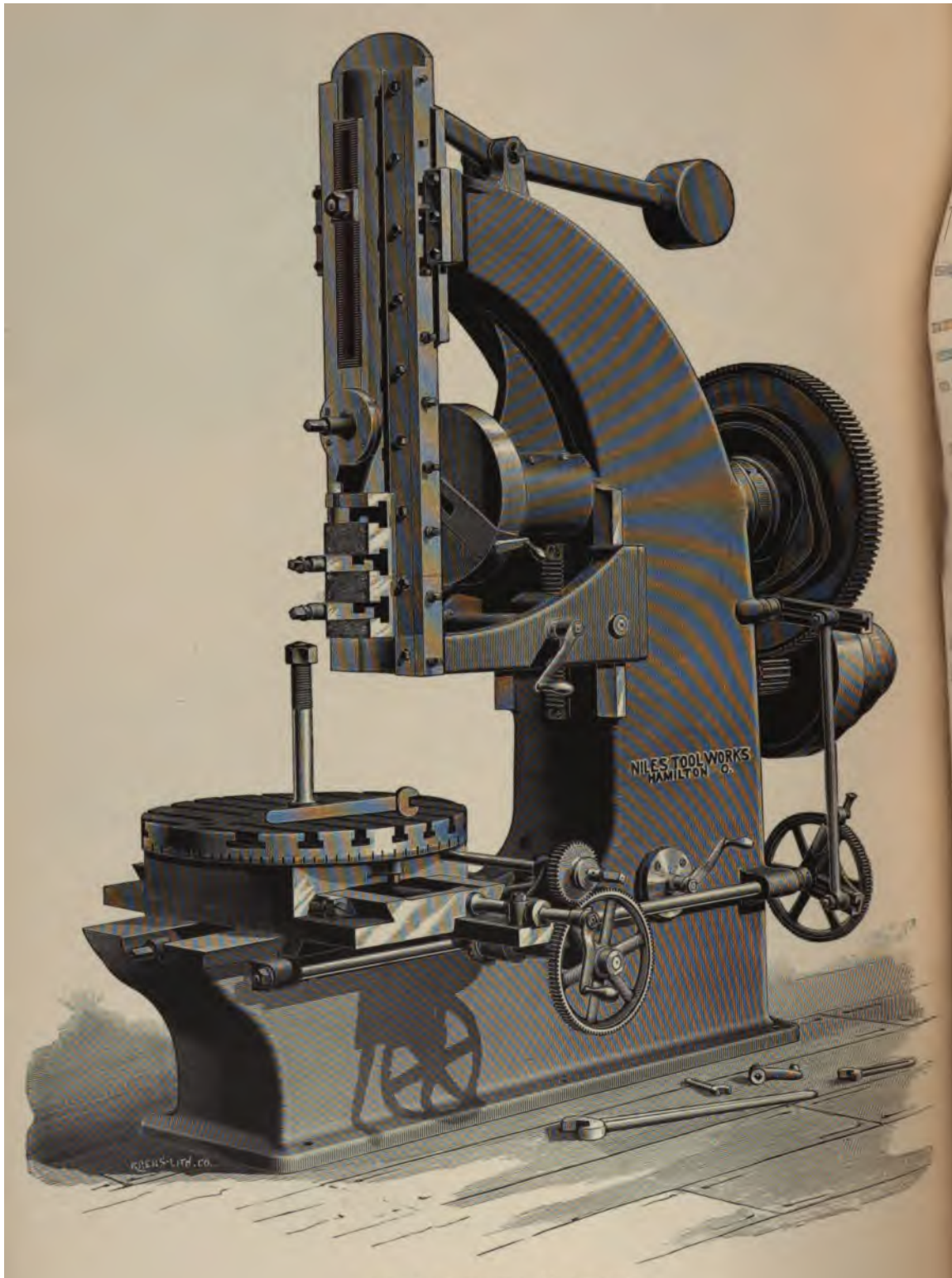
The countershaft has two pulleys 14 inches diameter, 4 inches face. Speed of countershaft, 200 revolutions.

This machine is especially heavy and powerful—without doubt the heaviest and most powerful Shaping Machine built in this country.

The cutter bar is made very stiff, and with a very long bearing, and is capable of taking a heavy cut at its extreme stroke.

A great variety of work too large for an ordinary Shaper can be planed to much better advantage than on a planing machine, and at a great saving of time.

For railroad and locomotive work the machine is particularly valuable.



14-Inch Slotting Machine.

Slotting Machines.

THESE Slotting Machines are built from new and improved patterns, and are of the most modern construction. Special reference has been paid in their design to great strength, power and convenience of operation.

The cutter bar is operated by means of the Whitworth motion, in the same manner as our Shaping Machines, giving a slow motion under the cut and a quick return. The cutter bar is also counterweighted, which entirely prevents any jar in running.

Within their rated limit these machines are adjustable in length of stroke and also in position of the cutter bar, so as to suit work of different height, and they are also provided with long bearing slides which are adjustable vertically. By this means the cutter bar is always supported close to the work, which makes it very stiff and free from any tendency to spring. This is a very important feature, as in many classes of work the adjustable slide made be let down close to the table behind the work, and the cutter so arranged on the bar that it may be supported its entire stroke. When working under such conditions the machine is as effective as a powerful planer.

The actual stroke of these machines is enough greater than the rated stroke to allow for the operation of the feed, so that the full rated stroke of the machine is always available for work.

The tables have compound movement, with power feed in either direction. They have also a circular table which is fed automatically by tangent gearing. The circular table is arranged to be clamped when feeding by either of the compound movements.

The feeds invariably take place at the upper end of the stroke—never during the cut.

The handles for operating the feeds are all placed close together so that the operator can handle any of them from the same position. He can, also, at the same time watch the cutting tool.

The general construction of these machines is such as to insure stability. In addition to this the convenience of handling enables the operator to get out the great amount of work of which such tools are capable.

They are built in the following sizes: 6½, 10, 14, 18 and 30-inch.

Heavy geared Slotters are built of the following sizes: 24 and 54-inch.

10-Inch Slotting Machine.

THE cutter bar has 10¾ inches stroke. The driving cone has three steps for a belt 4 inches wide.

The machine will take in work 48 inches diameter.

The table is 26 inches diameter. It has 20 inches longitudinal and 17 inches transverse traverse.

Countershaft pulleys are 20 inches diameter, 4½ inches face. Speed of countershaft, 120 revolutions per minute.

14-Inch Slotting Machine.

THE cutter bar has 14¾ inches stroke. The driving cone has four steps for a belt 4 inches wide.

The machine will take in work 60 inches diameter.

The table is 30 inches diameter. It has 28 inches longitudinal and 22 inches transverse traverse.

Countershaft pulleys are 20 inches diameter, 4½ inches face. Speed of countershaft, 150 revolutions per minute.

18-Inch Slotting Machine.

THE cutter bar has 19 inches stroke. The driving cone has four steps for a belt 4½ inches wide.

There are two sets of pulleys on countershaft, thus giving the cutter bar eight changes of speed.

The table is 42 inches diameter. It has 42 inches longitudinal and 30 inches transverse traverse.

The machine will take in work 78 inches diameter.

The countershaft has three pulleys, two loose and one tight, 24 inches diameter, 10 inches face, for 4½-inch belt.

Speeds of countershaft, 110 and 136 revolutions per minute.

6½-Inch Slotting Machine.

DESIGNED FOR HEAVY WORK, SUCH AS CUTTING OFF THE ENDS OF STEEL RAILS AND SHAPING UP ROUGH FORGINGS.

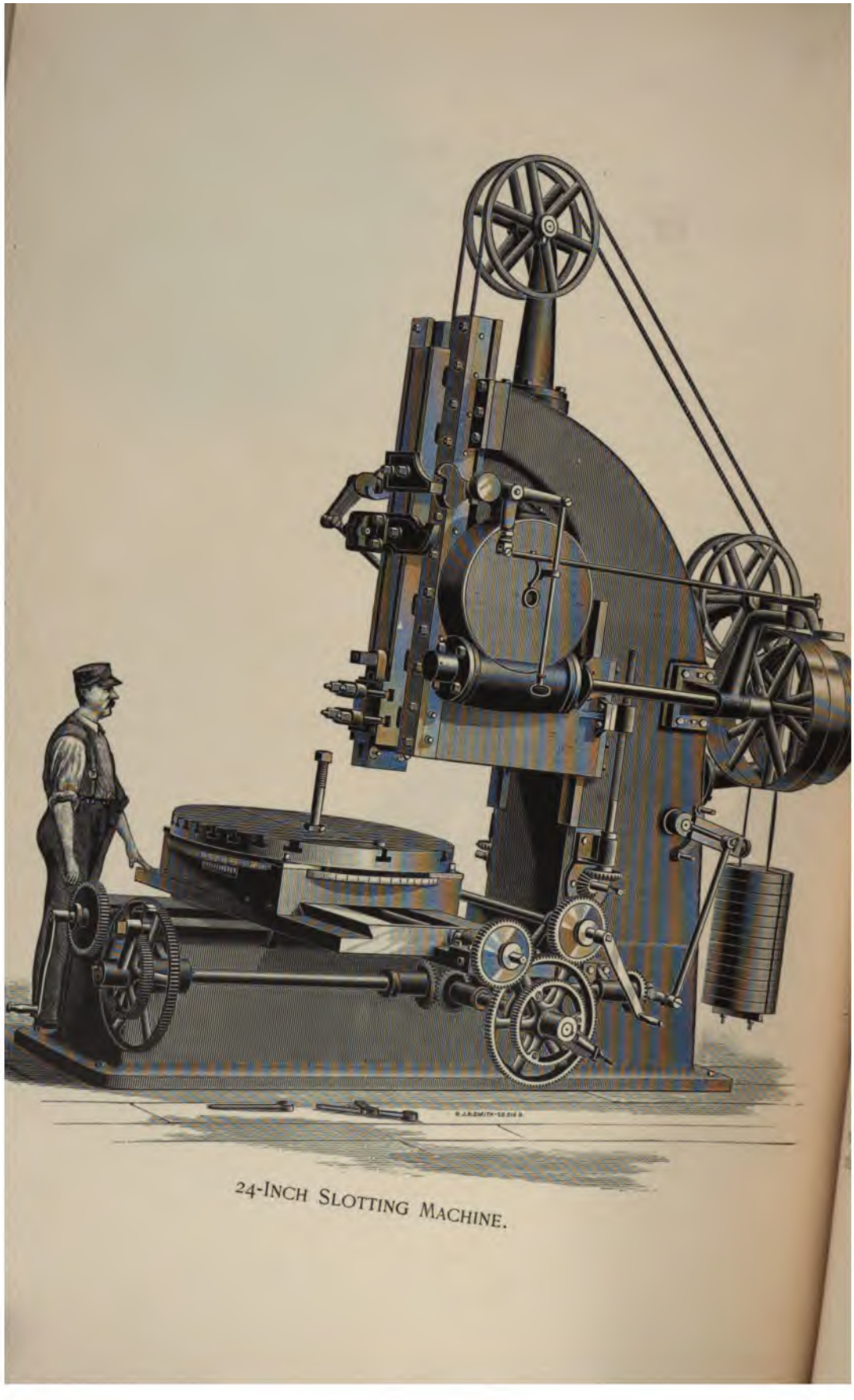
THE machine has all the power of an 18-inch Slotter, and is built to stand this heavy duty.

The cutter bar has 7 inches stroke. The driving cone has three steps for a belt 4 inches wide.

The machine will take in work 40 inches diameter.

The square table is 21½x21½ inches; longitudinal traverse, 18 inches; transverse traverse, 18 inches. A circular table may be provided for the machine if desired.

The countershaft pulleys are 24 inches diameter, 5 inches face. Speed, 120 revolutions per minute.



24-INCH SLOTTING MACHINE.

24-Inch Slotting Machine.

A MACHINE OF GREAT WEIGHT AND POWER, DESIGNED FOR HEAVY SERVICE IN FORGES, ETC

THE cutter bar has 26 inches stroke.

The machine will take in work 7 feet 6 inches diameter.

Diameter of circular table, 50 inches. Longitudinal traverse of table, 40 inches. Transverse traverse, 36 inches.

The driving pulleys are 30 inches diameter for 3-inch belt.

The countershaft pulleys are 22 inches diameter, 5 inches face.

This machine is unexcelled for slotting heavy engine cranks, shaping bases, trimming working beams, and all kindred work in steam forges. It is also the most economical machine to use in shops where heavy steel castings are extensively used.

This and the succeeding 54-inch machine bear the same relation to the slotting tools that the Heavy Forge Lathes and Planers do in their class. They are much heavier and stiffer in construction, and are calculated to withstand much more duty than machine shop slotters as ordinarily constructed. Notwithstanding their weight and power these machines are very readily handled, as all their movements are quickly controlled.

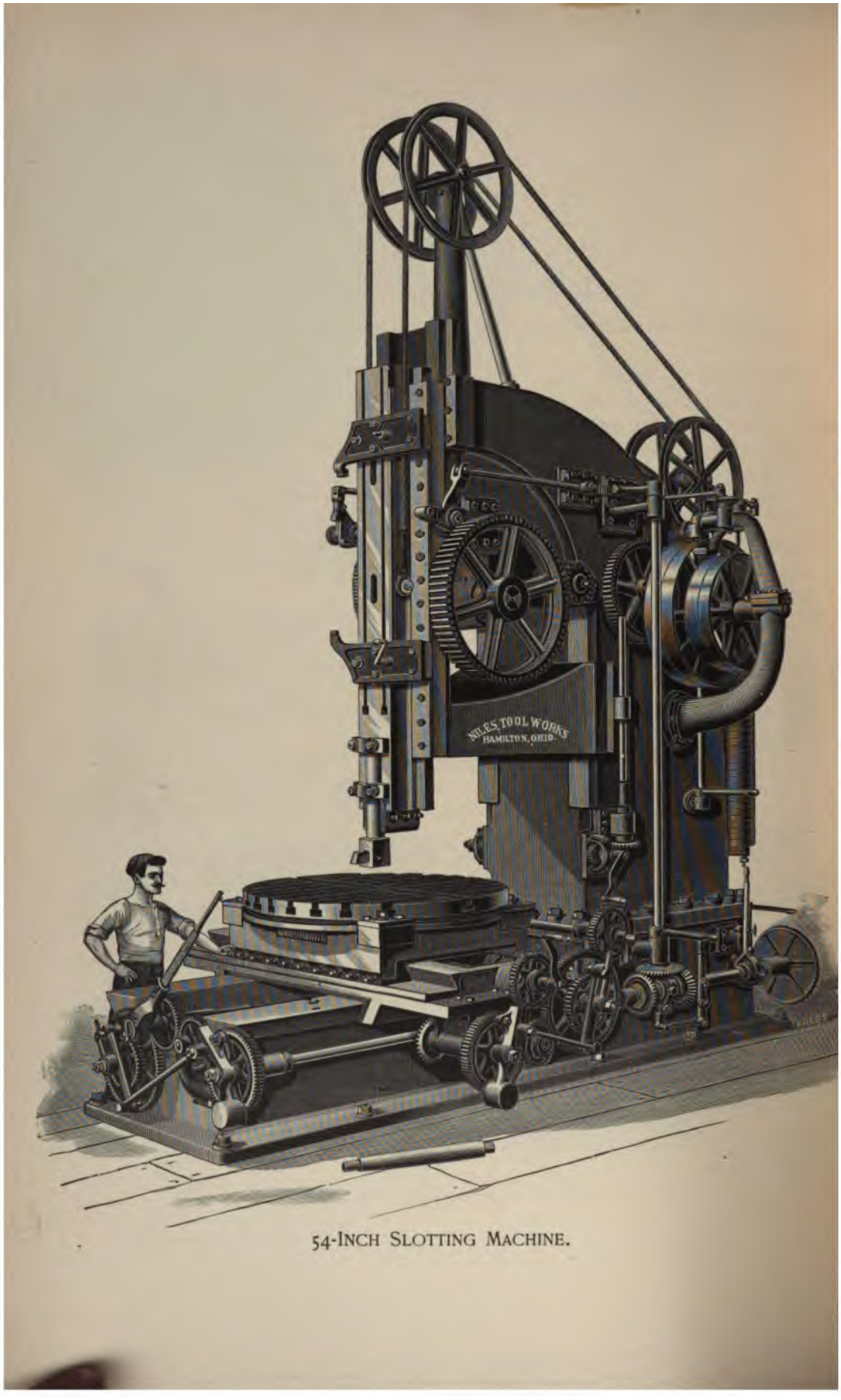
This machine is a very strongly geared tool. The cutter bar is driven by rack and pinion operated by tangent gearing, adapting it to very heavy cutting. It is counterweighted and has quick return, and is also provided with an improved relief motion.

The actual stroke of the bar is 50 inches, and it will operate on outside work of nearly that length. On inside work, placed below the ram guide, it will give the rated stroke of 24 inches.

The feeds are self-acting in all directions, and are readily adjusted and arranged so that the feed always takes place at the upper end of the stroke—never during the cut.

The cutter bar has a very long bearing which is adjustable vertically. This bearing may be raised or lowered to suit the work being operated upon. By this means the cutter bar is always supported close to the work, which makes it very stiff and free from any tendency to spring.

All the gearing is accurately cut from the solid.



54-Inch Slotting Machine.

54-Inch Slotting Machine.

A MACHINE OF GREAT STRENGTH AND POWER, DESIGNED FOR HEAVY SERVICE IN FORGES, ETC.

THE cutter bar has 58 inches stroke. Extreme length of cutter bar, 10 feet. The machine will take in work 10 feet in diameter.

Diameter of circular table, 66 inches. Longitudinal traverse of table, 60 inches. Transverse traverse, 50 inches.

Guide for cutter bar lowers to within 18 inches of the table and raises to 56 inches above the table.

Driving pulleys are 42 inches diameter for 4-inch belt.

Countershaft pulleys are 24 inches diameter, 6 inches face. Speed, 300 revolutions per minute.

This is a machine of immense strength and power. The cutter bar is driven by rack and pinion, adapting it for heavy cutting. The machine has sufficient power to take a 3-inch cut with $\frac{1}{16}$-inch feed. The cutter bar is counterweighted and has quick return.

The rated stroke of the machine is 54 inches, but on outside work, which can be placed in front of the cutter bar, a cut nearly 9 feet in length may be taken.

The feeds are self-acting in all directions and are readily adjusted. The feed is operated at the upper end of the stroke—never during the cut.

The tables have compound movement. They are moved by power in any direction, consequently they may be handled as easily as the tables of the smallest machines.

The cutter bar has a very long bearing, which is adjustable vertically. This bearing is raised or lowered to suit the work being operated upon. The range from which it may be moved is stated above. By this means the cutter bar is always supported close to the work, which makes it very stiff and free from any tendency to spring. The cutter bar is provided with improved relief motion.

All the gearing is accurately cut from the solid.

TESTIMONIALS AND REFERENCES.

TESTIMONIALS.

Lehigh Valley Railroad.

OFFICE SUPT. BRIDGES,
Niles Tool Works, Hamilton, O. EASTON, PA., Oct. 17, 1890.

Gentlemen:—Your 16-inch Traveling Head Shaper has been in constant use in my shops for the past two years. I consider it one of the best tools ever designed of this kind, and up to date it has given us entire satisfaction. Yours truly, W. F. PASCOE,
Superintendent.

Fox Solid Pressed Steel Co.

Niles Tool Works, Hamilton, O. JOLIET, ILL., August 28, 1890.

Gentlemen:—Replying to yours of the 26th inst., we wish to say that we are very much pleased with the 20-inch Traveling Head Shaping Machine furnished by you. We find it easily handled, and it is doing first-class work. Yours faithfully, F. P. DAVIDSON,
Superintendent.

Cross Creek Collieries.

Niles Tool Works, Hamilton, O. DRIFTON P. O., LUZERNE CO., PA., Sept. 15, 1890.

Gentlemen:—In answer to your inquiry would say that the 16-inch Traveling Head Shaping Machine which we purchased from you has been in constant use ever since we received it, and gives very good satisfaction. Yours truly, COXE BROS. & CO.

St. Louis, Arkansas and Texas Railway.

MACHINERY DEPARTMENT,
Niles Tool Works, Hamilton, O. PINE BLUFF, ARK., June 9, 1888.

Gentlemen:—We have had one of your 16-inch Shaping Machines in service in our Pine Bluff shops for the past year, and I consider it a first-class machine in every respect. It is strong and substantially built. Yours truly, L. FINLAY,
General Master Mechanic.

The DeLavergne Refrigerating Machine Co.

Niles Tool Works, Hamilton, O. NEW YORK, Sept. 6, 1890.

Gentlemen:—Yours of the 4th inst., asking our opinion of the 18-inch Slotter purchased of you last year, received. In reply would say that the 18-inch, as well as the 10-inch Slotter, have proven to be all you claimed for them. We have had no occasion to regret our purchase nor discovered any fault. Should we place any more Slotters in our works we would not hesitate to duplicate the same design. Yours very truly, E. V. CLEMENS,
Superintendent.

REFERENCES.—SHAPERS.

Denver and Rio Grande R. R.
Cincinnati, New Orleans & Texas Pacific R. R.
Grand Rapids and Indiana R. R.
New York, Chicago and St. Louis R. R.
Northern Pacific R. R.
Louisville, Evansville and St. Louis R. R.
St. Paul, Minneapolis and Manitoba R. R.
East Tennessee, Virginia and Georgia R. R.
St. Louis and San Francisco R. R.
St. Louis, Arkansas and Texas R. R.
Coxe Bros. & Co., Drifton, Pa.
Duluth and Iron Range R. R.
United States Gun Foundry, Washington, D. C.
DeLavergne Refrigerating Machine Co., N. Y.
Southern Pacific R. R.
Ohio and Mississippi R. R.
Missouri Pacific R. R.
Minnesota and Northwestern R. R.
Noble Bros. & Co., Anderson, Ala.
Delaware, Lackawanna and Western R. R.
Joliet Steel Co., Joliet, Ill.
Lehigh Valley R. R.
Union Pacific R. R.
Georgia Pacific R. R.
Edgar Thompson Steel Co., Pittsburg, Pa.
Illinois Central R. R.
Mexican National R. R.
Buckeye Engine Co., Salem, O.

REFERENCES.—SLOTTERS.

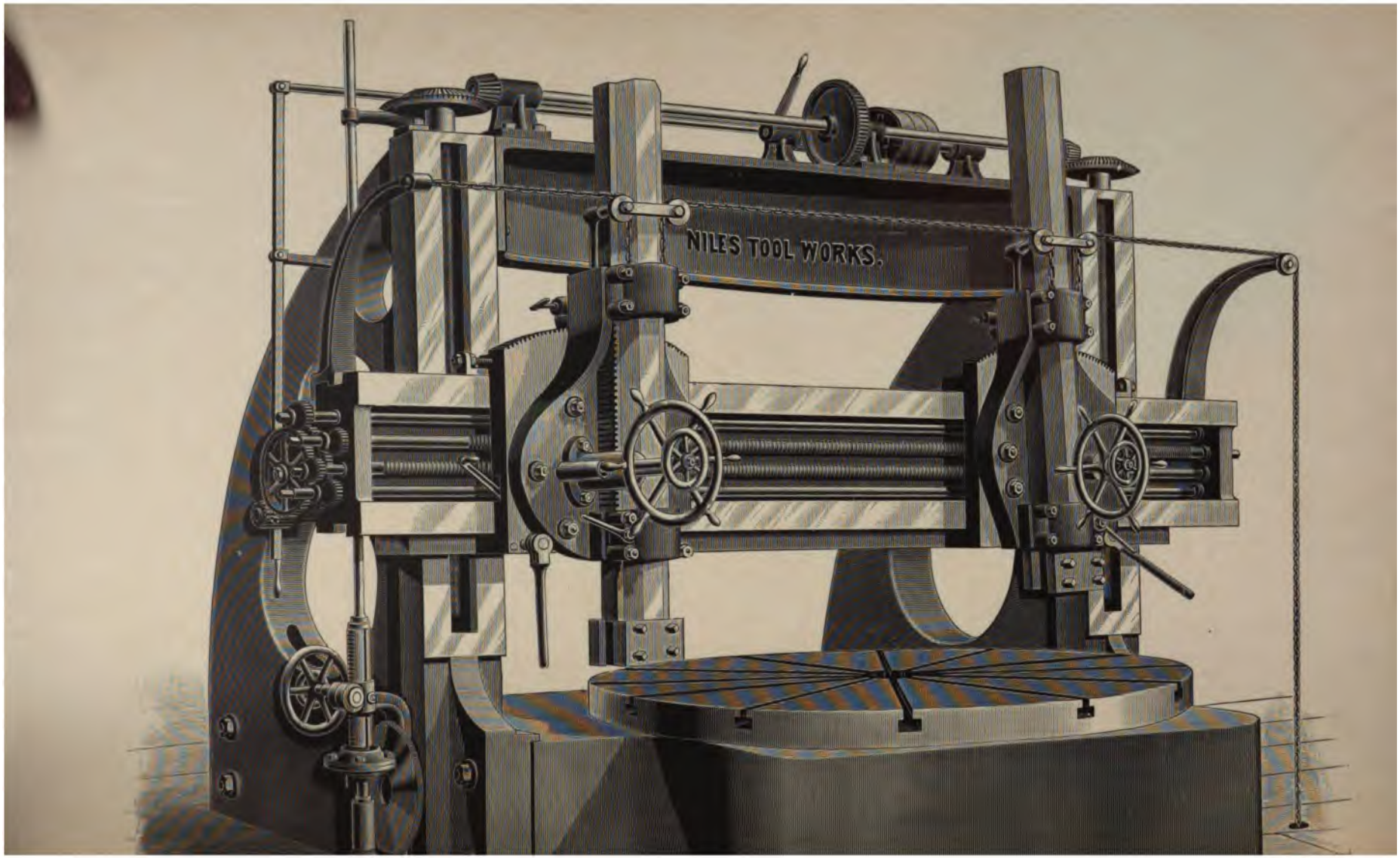
Ramapo Iron Works, Ramapo, N. Y.
Chester Steel Works, Chester, Pa.
Chicago, Milwaukee and St. Paul R. R.
Ohio Central R. R.
Chicago, St. Paul, Minneapolis & Omaha R. R.
American Tool and Machine Co., Boston, Mass.
Missouri Pacific R. R.
Dickson Manufacturing Co., Scranton, Pa.
Northern Pacific R. R.
Roanoke Machine Works, Roanoke, Va.
Kentucky Central R. R.
Lidgerwood Manufacturing Co., N. Y. City.
New York, Chicago and St. Louis R. R.
American Ship Building Co., Providence, R. I.
East Tennessee Virginia and Georgia R. R.
St. Louis Iron & Mach. Co., St. Louis, Mo.
Chicago, Burlington & Quincy R. R.
North Chicago Rolling Mills, Chicago, Ill.
Minnesota and Northwestern R. R.
Robert Tarrant, Chicago, Ill.
Gordon, Strobel & Laureau, Philadelphia, Pa.
Ainslee, Cochran & Co., Louisville, Ky.
St. Paul and Duluth R. R.
Pennsylvania R. R.
Morgan Engineering Co., Alliance, O.
New York, West Shore and Buffalo R. R.
Lehigh Valley R. R.
St. Louis, Arkansas and Texas R. R.
Frankfort Arsenal, Philadelphia, Pa.
Chesapeake and Ohio R. R.

PART VI.

BORING AND TURNING MILLS.

NILES TOOL WORKS,

HAMILTON, OHIO.


NILES TOOL WORKS.

PART VI.

Boring and Turning Mills.

THE illustrations on opposite and succeeding pages represent our latest improved Boring and Turning Mills, the design and construction of which are the result of an experience probably far greater than that of any other builder of Machine Tools.

In its present state of perfection, the Boring Mill possesses several important advantages over the lathe for many classes of work. These advantages are as follows:

1. That its work-table is supported by the bed at its perimeter as well as at its center, whereas in a lathe the weight of the chuck plate, as well as that of the work, overhangs a journal of comparatively small diameter, and is therefore, more subject to spring, deflection and vibration.

2. It will carry two slide rests more readily adjustable to an angle, and more easily operated than a lathe slide rest.

3. It is much more easy to chuck work on a boring mill table than on a lathe chuck, because on the former the work is more readily placed upon the table, and rests upon it so that in wedging up or setting any part of the work circumference to the table, there is no liability to move the work at the other points of support upon the table; whereas in a lathe, the work standing vertical, is apt, when moving it at one part to set it, to move at another part and become unset, and furthermore requires to be held and steadied while first being gripped by the chucking dogs, plates, or other holding devices.

The great range of work that a Boring and Turning Mill is capable of performing is not fully appreciated by some who are not sufficiently familiar with its uses. Many are deterred from considering the purchase of these machines, looking upon them as involving a heavy investment upon a tool not often used. As a matter of fact, the Boring Mill never stands still. A twelve-foot mill will work on small work, of the kind to which it is adapted, to such an advantage over a lathe as to justify its use, regardless of the large work of which it is capable. Numerous small pieces, bolted to its remarkably convenient table, can be simultaneously faced off with a facility not to be found in lathes, planers, or shaping machines.

Almost anything that a lathe can do, and much that it can not do, can be done on these improved Boring Mills, and usually in much shorter time and in a more satisfactory manner. The time gained in the mere matter of setting unwieldy and irregularly shaped pieces will alone foot up to a handsome profit in favor of these machines. Every machinist is acquainted with the annoyance of fastening work of this class to a vertical face-plate, and, should an account of this expense (from loss of time and extra help) be kept, it would even then far exceed the usual estimate.

These machines can be operated with peculiar facility. The rail is raised and lowered by power; the tools have quick hand motions; both tools are operated from one side, and much running about is thus avoided; the machine is better adapted to the use of two tools than a lathe; the adjustment of both tools is easily effected, and both tools are in full view of the operator.

The machines built by us, have, by reason of their excellence in all respects, gained for themselves a most enviable reputation throughout the world. They possess every improvement that a long experience in their manufacture could suggest, and they are confidently offered as the most complete machines of their kind ever made.

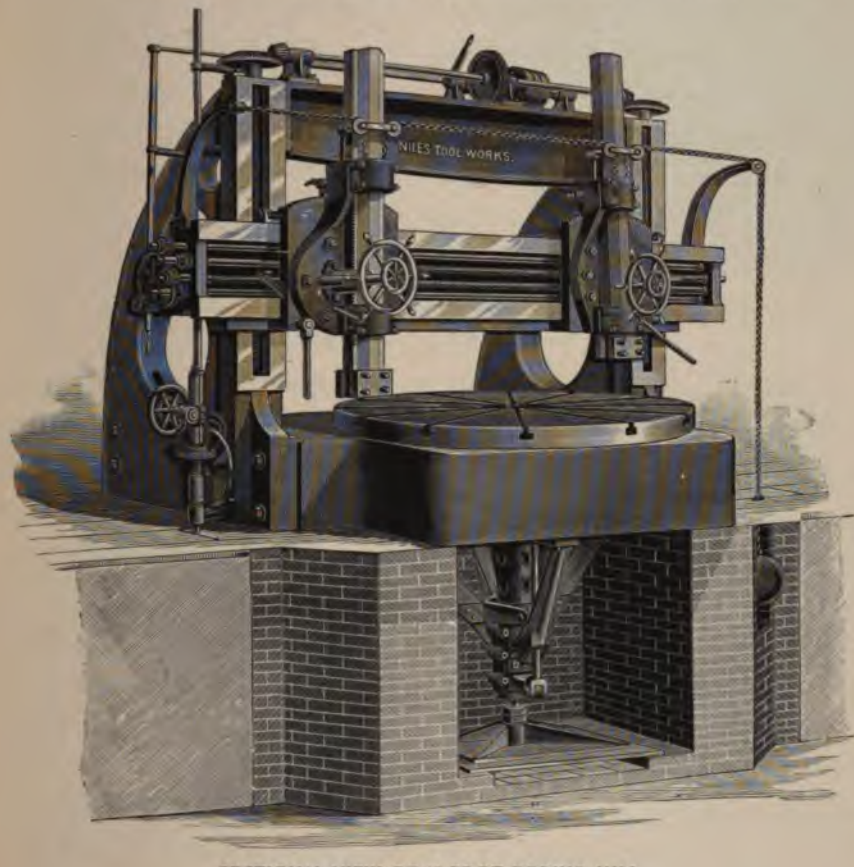
When these machines are supplied with our pulley turning attachments they are capable of results in the pulley turning line that are almost past credence. Some of the letters from users, found elsewhere herein, will indicate the nature of some of these remarkable performances.

The five, six and seven-foot machines answer admirably for railroad machine shops and car builders. When designed for this special duty, and provided with universal chuck and crane, they will bore from sixty to seventy-five car wheels in ten hours, and are eminently suited to boring chills and doing other work about such establishments.

Improvements have been made by us in these machines to meet the greatly extended use of Boring and Turning Mills. We have hundreds of them in use in the leading shops of this country and Europe.

In fact, no shop is now considered well equipped without such a machine.

Niles Boring and Turning Mills.



SECTIONAL VIEW OF 12-FOOT BORING MILL.

GENERAL DESCRIPTION.

DRIVING GEAR.—The table is driven by an accurately cut internal spur gear. The cone transmits power to a pair of heavy, cut bevel-gears, thence to a steel pinion driving the internal spur on the table. This construction insures a steady running machine without chatter, and free from any lifting tendency.

SPINDLE.—The spindle is of great length, with very liberal bearings. It rests below on a steel step. The spindle bearing has ample provision for taking up wear, and this adjustment is arranged to keep the spindle central.

CONE.—The driving cone is placed at the side of the machine, and the belts are as convenient as on a lathe. Each Mill is strongly back geared, giving a wide range of speeds.

TABLE BEARING.—An annular bearing under the outer edge of the table is provided, and when heavy pieces are to be worked the spindle step is relieved and the table allowed to rest lightly on this outer bearing. Thus adjusted the machine works with all the steadiness of a heavy planer, and all the precision of the most accurate lathe.

BORING BARS.—The boring bars are square in section, accurately fitted to their bearings. One bar is brought exactly central with the spindle. This form of bar is very stiff and rigid, and at the same time convenient to handle. The tool holders are steel forgings, arranged to hold the tools in any required position, and may be removed for other tool holders if desired. The bars may be set over at any angle, and are quickly handled by means of worm and worm wheel. They may be fed in any direction independently of each other.

COUNTERWEIGHT.—Many attempts have been made to secure a balancing device for the bars that will compare in simplicity and efficiency with our patented device. This device, simple as it appears, is worthy of consideration. It will be noticed by inspecting the cut, that a single chain is attached at one end to an arm rigidly secured to the rail, and that a similar arm on the other end of the rail carries a pulley over which the weighted end of the chain falls. There is a sheive on the face of each tool bar, and each saddle carries two sheives straddling its bar, and the chain is looped over the single sheive and under the tool bar sheive. This is a very simple and perfect arrangement, and possesses quite a number of advantages not apparent at first sight.

1. The counterweight requires to be only half as heavy as the parts to be counterbalanced.

2. The counterbalance is perfect, no matter how much one or both of the tool bars may be set over for angular work. As the saddles are moved along the rail no effect is had upon the counterbalance weight, the sheive simply moving along the chain. When the swing is unbolted so that it may set over to an angle, the counterweight has no tendency to pull the swing around and endanger a workman's life.

3. When a saddle nut is opened and a swing is quickly moved along by the ratchet lever, the counterweight has no tendency to resist the motion or to suddenly pull the swing along the rail out of control of t

4. There are no overhead arrangements to interfere interfered with by belts or cranes.

FEEDS.—The feeds are operated by a friction disk, and have a range from $\frac{1}{32}$ to $\frac{9}{16}$-inch. This feed is thoroughly reliable and very simple in construction and operation. It may be instantly varied to any degree within its range.

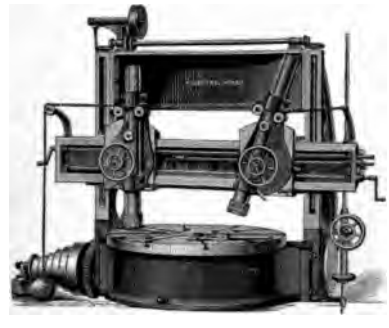
At the end of the rail are a pair of gears by means of which the speed can be increased or decreased 100 per cent. without shifting the friction disk.

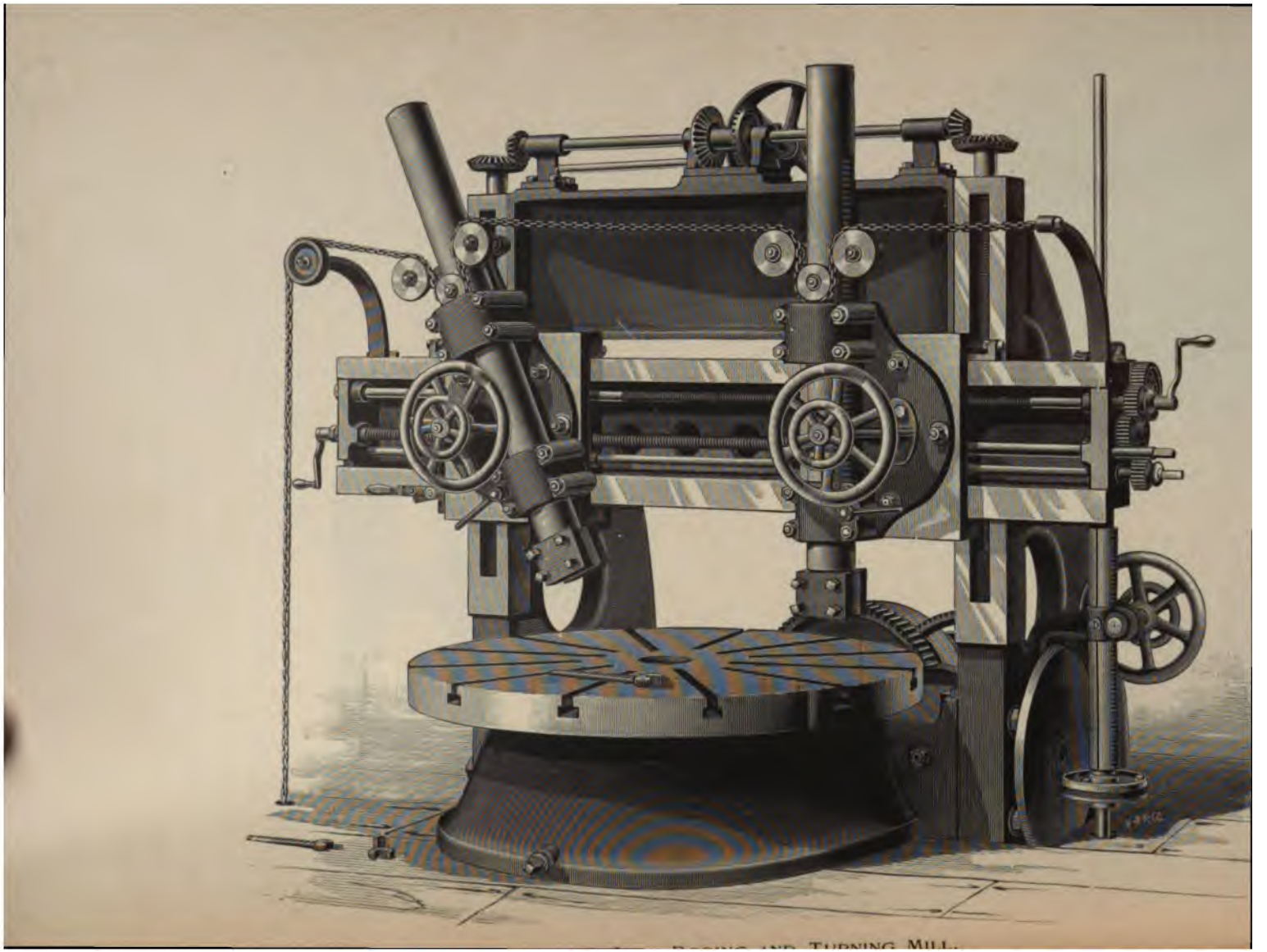
The feeds are independent. The saddles or bars may be fed in the same or in opposite directions at the same time.

CROSS RAIL.—The rail is of box-girder form, with wide bearings. It is raised and lowered by power. The saddles are made right and left so that they may be brought close together. The right-hand saddle has quick hand traverse by rack and pinion.

IN GENERAL.—These Mills are the result of years of experience, both in their construction and operation, and embody the most advanced practice in machine tool construction.

Ample weight has been given to all the parts. All sliding fits are made by scraping, and the workmanship throughout is of the best character.





60-Inch Boring and Turning Mill.

(Patented April 11, 1871, May 17, 1881, and May 23, 1882.)

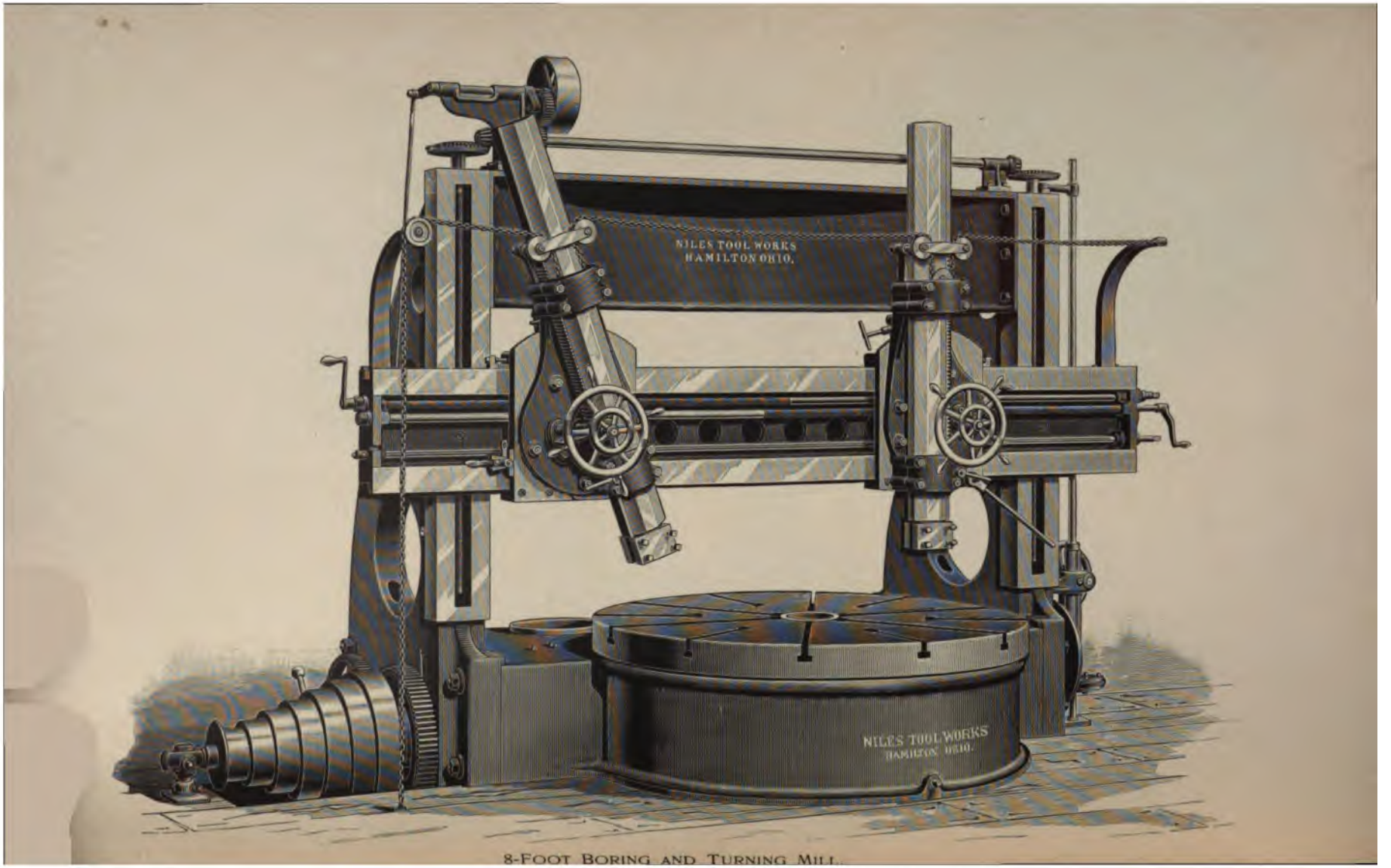
SWINGS 60 inches diameter, and takes in work 28 inches high under the tool holders.

The driving cone has six steps for a 4-inch belt, and is strongly back geared, giving twelve changes of speed.

The table of this Mill is driven by accurately cut bevel gearing. The boring bars are round steel forgings, with 20 inches traverse.

This machine has been designed as a HANDY, SERVICEABLE TOOL, in shops where a variety of small boring and turning is to be done. This Mill will do such work much more rapidly than it can be done in any other way. It is convenient, easily handled, and with ample power.

The countershaft pulleys are 20 inches diameter, 4½ inches face. Speed, 200 revolutions.



8-Foot Boring and Turning Mill.

6-Foot Boring and Turning Mill.

(Patented April 11, 1871, May 17, 1881, and May 23, 1882.)

SWINGS 73 inches diameter. Takes in under the tool holders, when the rail is raised to the top, 36 inches. Boring bars have 32 inches traverse. Cone has six steps for 4-inch belt, and is strongly back geared. Range of feed, from $\frac{1}{32}$ to $\frac{9}{16}$ inch.

Countershaft pulleys 18 inches diameter, 4½ inches face. Speed, 175 revolutions.

7-Foot Boring and Turning Mill.

(Patented April 11, 1871, May 17, 1881, and May 23, 1882.)

SWINGS 85 inches diameter. Will take in under the tool holders, when the rail is raised to the top, 42 inches. Boring bars have 32 inches traverse. Cone has seven steps for 4-inch belt, and is back geared. Range of feed, from $\frac{1}{32}$ to $\frac{9}{16}$ inch.

Countershaft pulleys 20 inches diameter, 4½ inches face. Speed, 175 revolutions.

This Mill is a very desirable machine for locomotive and railroad shops. It is adapted to a wide range of work in such shops, and is invaluable for boring and turning steel tires, boring drivers, cylinders, etc.

When desired we can supply this Mill with a Universal Car Wheel Chuck and Crane, and the machine will do splendid work in boring wheels.

8-Foot Boring and Turning Mill.

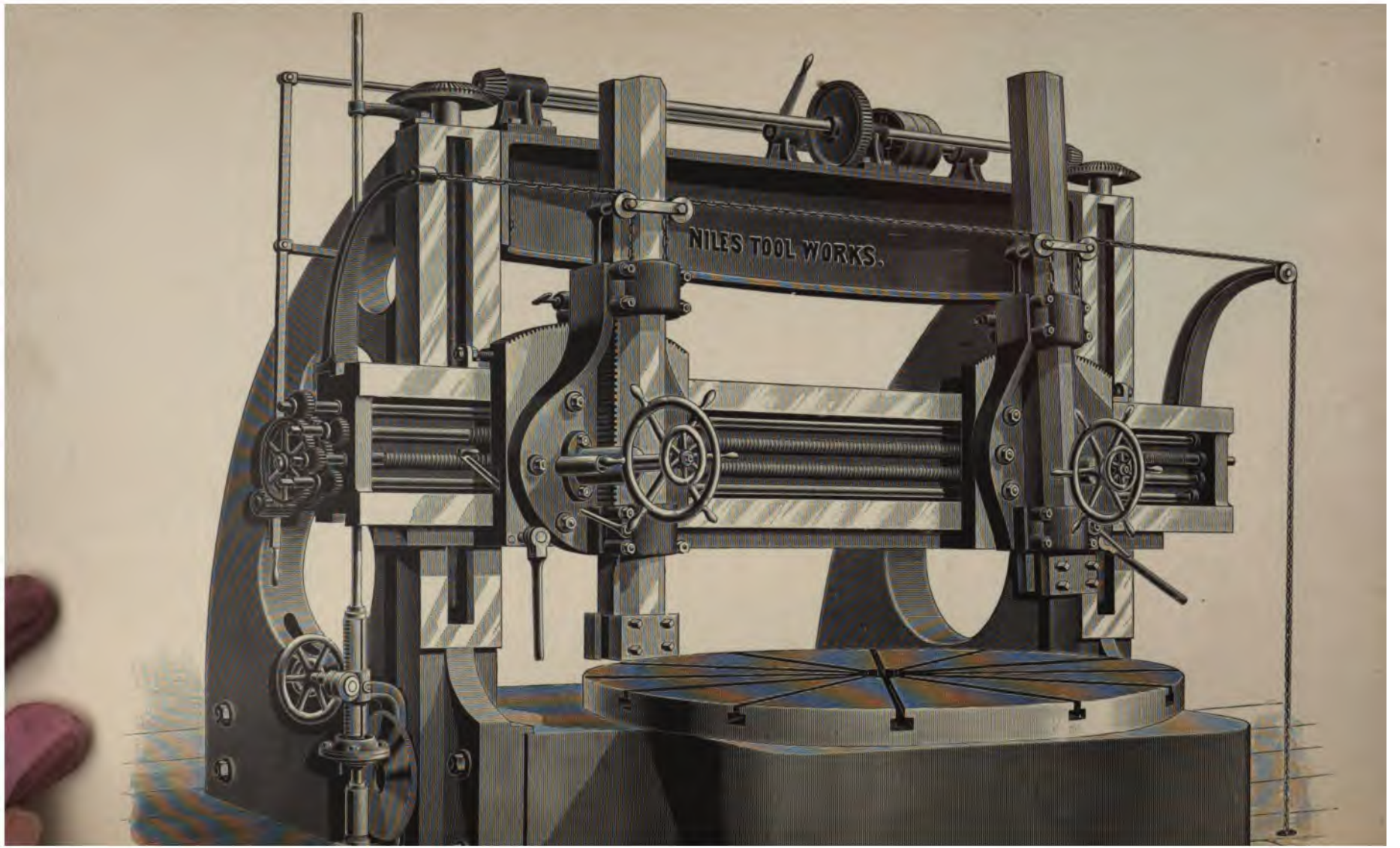
(Patented April 11, 1871, May 17, 1881, and May 23, 1882.)

SWINGS 97 inches diameter. Takes in under the tool holders, when rail is raised to the top, 48 inches. Boring bars have 32 inches traverse. Cone has seven steps for 4-inch belt, and is back geared. Range of feed, from $\frac{1}{32}$ to $\frac{9}{16}$ inch. Countershaft pulleys 20 inches diameter, 4½ inches face. Speed, 160 revolutions.

10-Foot Boring and Turning Mill.

(Patented April 11, 1871, May 17, 1881, and May 23, 1882.)

SWINGS 121½ inches diameter. Will take in under the tool holders, when the rail is raised to the top, 54 inches. Boring bars have 32 inches traverse. Cone has seven steps for 4-inch belt, and is back geared. Range of feed, from $\frac{1}{32}$ to $\frac{9}{16}$ inch. Countershaft pulleys 20 inches diameter, 4½ inches face. Speed, 125 revolutions.


NILES TOOL WORKS.

12-Foot Boring and Turning Mill.

(Patented April 11, 1871, May 17, 1881, and May 23, 1882.)

SWINGS 146 inches diameter. Will take in under the tool holders, when the rail is raised to the top, 60 inches. Boring bars have 48 inches traverse. Cone has nine steps for 4-inch belt, and is back geared. Range of feed from $\frac{1}{32}$ to $\frac{9}{16}$ inch.

Countershaft pulleys 28 inches diameter, 5¾ inches face. Speed, 160 revolutions.

14-Foot Boring and Turning Mill.

(Patented April 11, 1871, May 17, 1881, and May 23, 1882.)

SWINGS 169½ inches diameter. Will take in under the tool holders, when the rail is raised to the top, 7 feet 6 inches. Boring bars have 48 inches traverse. Cone has nine steps for 4-inch belt, and is back geared. Range of feed from $\frac{1}{32}$ to $\frac{9}{16}$ inch.

Table is 8 feet 2 inches in diameter. Countershaft pulleys 28 inches diameter, 5¾ inches face. Speed, 160 revolutions. Weight, 48 tons.

16-Foot Boring and Turning Mill.

(Patented April 11, 1871, May 17, 1881, and May 23, 1882.)

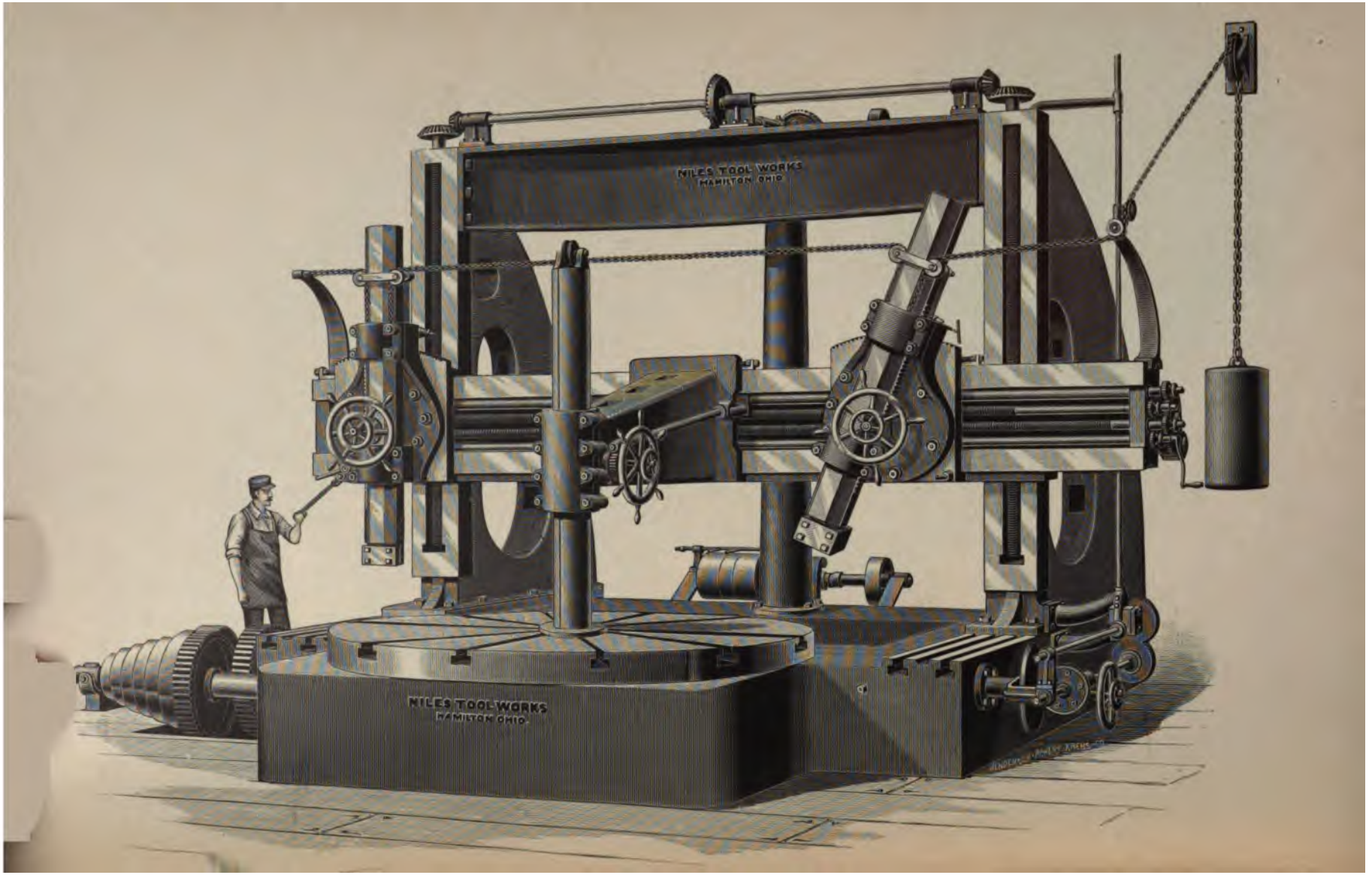
SWINGS 16 feet 2 inches diameter. Will take under the tool holders, when the rail is raised to the top, 90 inches. Boring bars have 48 inches traverse. Cone has seven steps for 5-inch belt, and is double geared. Range of feed, from $\frac{1}{32}$ to $\frac{9}{16}$ inch.

Table is 10 feet in diameter. Countershaft pulleys 28 inches diameter, 5¾ inches face. Speed, 160 revolutions. Weight, 55 tons.

16-Foot Extra Heavy Boring and Turning Mill.

SWINGS 16 feet 2 inches diameter. Takes in under the tool holders, when the rail is raised to the top, 10 feet. Boring bars have 48 inches traverse. Cone has seven steps for 6-inch belt, and is double geared, giving twenty-one changes of speed. Range of feed, from $\frac{1}{32}$ to $\frac{9}{16}$ inch.

Table is 10 feet in diameter. Cross rail is 32 inches wide and of great depth. Countershaft pulleys 36 inches diameter, 7 inches face. Speed, 125 revolutions. Weight, 90 tons.


NILES TOOL WORKS
HAMILTON OHIO
NILES TOOL WORKS
HAMILTON OHIO

Boring and Turning Mills with Extensible Housings.

THESE Mills are designed to meet the wants of machine shops for a tool which can be arranged to work to advantage, occasionally, upon pieces of very large diameter and yet be of convenient size for handling every-day jobs. Any of our Mills of 10-foot swing and over can be constructed in this way.

They are made with extensions at the back, and power apparatus for moving the housings, together with the cross rail and attachments, back so as to take in pieces of large diameter. The extensions are heavy castings of ample strength, fitted to the bed so as to form a continuous and true bearing with the bed for the housings, which are carefully scraped to fit. The truth and parallelism of the housings and cross rail are therefore maintained in all positions.

Care is taken that in turning the largest work the boring bars are never thrown out beyond the support of the housings. The strain is always brought directly against them.

The power of the machine is increased to enable the Mill to operate on work of large diameter to excellent advantage, and every facility is provided for convenience in operation. An extension boring head, with bar having power feed, is provided for boring work when the Mill is extended.

The change from standard to large work is quickly made by means of power attachments.

10-16-Foot Boring and Turning Mill.

SWINGS 121½ inches with housings closed, and 16 feet when extended. Will take under tool holders 54 inches. Bars traverse 24 inches.

Cone has seven steps for 4-inch belt, and is back geared.

Range of feed, from $\frac{1}{32}$ to $\frac{9}{16}$ inch.

Overhead countershaft pulleys 20 inches diameter, 4½ inches face. Speed, 125 revolutions.

14-20-Foot Boring and Turning Mill.

SWINGS 169½ inches closed, and 20 feet when housings are extended. Will take under the tool holders 90 inches. Bars traverse 48 inches.

Cone has seven steps for 5-inch belt, and is double geared.

Table is ten feet in diameter. An independent, removable boring bar, with power feed and quick return, is also provided.

Overhead countershaft pulleys 28 inches diameter, 5¾ inches face. Speed, 155 revolutions.

16-24-Foot Boring and Turning Mill.

SWINGS 194 inches closed, and 24 feet when housings are extended. Will take under tool holders 90 inches. Bars traverse 48 inches.

Cone has seven steps for 5-inch belt, and is double geared.

Table is ten feet in diameter. Independent, removable boring bar, with power feed and quick return, is provided.

Tire Boring and Turning Mill, 5-Foot Swing.

HEAVY PATTERN.

THIS Mill is designed for heavy duty, such as boring steel tire for car wheels. It is of extraordinary strength and power.

It is provided with a heavy Universal Chuck for holding tires or wheels. This chuck is secured to the table of the Mill and may be removed, leaving the table clear for ordinary work. If desired, however, the table of the Mill may be fitted with chuck jaws and become the chuck itself.

The driving cone has five steps for a 4-inch belt, and is strongly back geared, giving ten changes of speed. Boring bars have 24 inches traverse.

Greatest distance from table to rail, 42 inches. Diameter of table, 55 inches.

Tire Boring and Turning Mill, 6-Foot Swing.

EXTRA HEAVY PATTERN.

THIS machine is designed for more than ordinary service. It was brought out for turning the hardest steel tires, and is capable of taking two ⅜-inch cuts with ⅛-inch feed. The pressure on the cuts to do this work is 14,000 pounds.

The cross rail is 23 inches wide, cored out in box-girder form, and fitted with saddles and bars of extra size and strength.

The boring bars are 10 inches square, fitted on four sides, giving them extra large bearings. The bars are fed by screw and nut, and the power feed is calculated for a resistance of 7000 pounds against it.

The driving cone has six steps for 4-inch belt, and is strongly back geared, giving twelve changes of speed. Cone is geared to table in the ratio of 136 to 1.

All feed gears are made of steel, and all gearing throughout cut from the solid.

A circular water trough surrounds the bed to take away lubricating water from the table. No slots are put through the table, thus preventing the corroding action of soda or other lubricant upon the driving gear.

In other respects the construction of the Mill is similar to our standard Mills heretofore described. This machine is extraordinarily heavy for a tool of this size. Weight, 42,000 pounds.

Special Attachments.

WHEN required, we furnish these Mills with special attachments for certain work. These attachments are extras, not ordinarily furnished with the Mills.

The prices named for Boring and Turning Mills do not include any of the attachments, but when they are required prices will be named to cover same.

CYLINDER BORING BAR.

An upright bar with suitable boring heads is frequently provided for boring large cylinders. The bar is stationary, the cylinder revolving about it on the table of the Mill. The boring heads have automatic screw feed.

SLOTTING AND KEY-SEATING ATTACHMENT.

A crank disk, operated by tangent gearing and driven by independent countershaft, is mounted on the top brace, made extra heavy for this purpose. An arm attaches to the bar of the Mill, giving an effective stroke of 16 inches.

This attachment will be found of service in key-seating large pulleys and similar work, and will do the work speedily and well.

PULLEY TURNING ATTACHMENTS.

The Pulley Turning Attachments consist of an equalizing double driving plate attached to the table, a tail stock attached to the cross rail, and a female center for the face plate.

After boring the pulley it is put on a mandrel, and the mandrel placed between the centers described above. The arms of the equalizing driver then come in contact with opposite pulley arms.

The pulley being turned on a mandrel without clamping, is turned true. A large amount of work may be turned out in this manner.

THREAD CUTTING ATTACHMENT.

For cutting threads in large valves, chasing grooves in hoisting drums, etc. An efficient device is made for this purpose. Heavy pitches may be cut, and the work is done very rapidly. The Boring Bars of our Mills are especially well adapted for such uses, being stiff and free from spring when cutting heavy pitches with the bar extended and without lower support. A full description of this device will be sent on application.

TESTIMONIALS AND REFERENCES.

TESTIMONIALS.

The Dickson Manufacturing Co.

Niles Tool Works, Hamilton, O. SCRANTON, PA., February 20, 1889.

Gentlemen:—In reply to your inquiry in relation to the 16-FOOT BORING AND TURNING MILL furnished this company by the Niles Tool Works, I would say that it has been in constant use for the past six (6) years, and for over two (2) years of that time running night and day.

It has proved that it is a first-class tool in every respect, and I KNOW OF NO OTHER TOOL OF ITS CLASS THAT IS MORE SUBSTANTIALLY MADE OR CAN TURN OUT MORE WORK in a given time than it can. Yours respectfully,

DICKSON MANUFACTURING CO.,
Per E. K. SANCTON, Superintendent.

Hill Clutch Works.

Niles Tool Works, Hamilton, O. CLEVELAND, O., October 15, 1890.

Gentlemen:—Referring to your inquiry regarding the Boring and Turning Mills of your manufacture, which we have had in use in our shops for nearly four years, it gives us pleasure to state that THESE BORING MILLS HAVE GIVEN US SO MUCH SATISFACTION THAT WE HAVE FROM TIME TO TIME PLACED NEW ORDERS WITH YOU, UNTIL WE HAVE NOW FOUR OF THEM IN USE.

These mills have been running twenty-two and one-half hours a day, without stopping, since they were first placed in our shops, as we run two crews, one night and one day. We are thoroughly satisfied that no better mills are made. Very truly yours,

HILL CLUTCH WORKS,
By H. W. HILL.

The DeLavergne Refrigerating Machine Co.

Niles Tool Works, Hamilton, O. NEW YORK, September 16, 1890.

Gentlemen:—In answer to your request that we express to you our opinion of the various kinds, and of the numerous Niles Machine Tools we have ordered of you, we wish to say, that the fact of our having FORTY-FIVE MACHINES now running in our extensive works, which we purchased from you, besides those which you have on order, should be expression enough to the normal mind that we are decidedly well pleased with our purchases, and we doubt if anything we could write would demonstrate our appreciation more emphatically than that fact.

Our foremen and best mechanics, more intelligent and capable than which there are none, although for the greater part unacquainted with the Niles Tools when they were employed by us, are loud in their praises after over a year's experience with them.

THE 10-FOOT PLANER and 14-FOOT BORING AND TURNING MILL are elegant tools; massive and rigid, at the same time accurate, scientifically designed and symmetrically proportioned, capable of very heavy work and much of it. THEY ARE ADMIRED BY ALL GOOD JUDGES, AMONG WHOM ARE TWO OF THE COUNTRY'S BEST TOOL BUILDERS, WHOSE REPRESENTATIVES HAVE MADE MEASUREMENTS AND SKETCHES OF THEM.

The 18-inch and 10-inch Slotters, the 54-inch, 36-inch, and 30-inch Lathes, the large Radial Drill, Horizontal Boring and Drilling Machine, 6-foot Vertical Mill, 18-inch Traverse Shaper, 30-inch Planer, and numerous other tools are also all you claim for them. Good workmanship can only be accomplished with the best of tools and the most expert mechanics. We wish to add that we have struck that combination. Yours very truly,

THE DELAVERGNE REFRIGERATING MACHINE CO.
E. V. CLEMENS, Superintendent.

Ludlow Valve Manufacturing Co.

Niles Tool Works, Hamilton, O. TROY, N. Y., October 22, 1890.

Gentlemen:—We are pleased to speak highly of the 10-foot Boring and Turning Mill purchased of you. It answers its purpose admirably. THE CHASING ATTACHMENT IS SPECIALLY GOOD. We know not where we could find a better machine for our use.

Yours truly, H. G. LUDLOW,
President.

Holyoke Machine Co.

Niles Tool Works, Hamilton, O. WORCESTER, MASS., April 29, 1890.

Gentlemen:—I see by our check book you have been paid for the last Boring Mill. WE NOW HAVE FIVE OF YOUR MILLS, and I wish to say we are entirely satisfied. The last two, with the new attachments, are preferred, but all are doing good work, and if we need more of these machines, which I hope we may, we shall buy from you without further consideration.

Yours very truly, S. HOLMAN,
Treasurer.

The Warder, Bushnell & Glessner Co.

Niles Tool Works, Hamilton, O. SPRINGFIELD, O., October 17, 1890.

Gentlemen:—In answer to your favor of the 14th inst., we desire to say that the Boring Mill we purchased from you some time ago has all the POWER, STRENGTH AND STIFFNESS required. It does nice, smooth work, and runs very steadily. In fact it is a first-class tool.

Very truly yours,
THE WARDER, BUSHNELL & GLESSNER CO.,
CHAS. A. BAUER, General Manager.

The Wilkin Manufacturing Co.

Niles Tool Works, Hamilton, O. MILWAUKEE, WIS., October 16, 1890.

Gentlemen:—Yours of the 14th is received. We have been using the 10-foot mill constantly night and day for the past nine months, and are pleased to state that it fully meets your representations. We have just finished a fly-wheel on it which weighs eleven tons, and on which we had no difficulty in taking a cut ⅝ inch deep with ¼ inch feed. We consider this a good test of the driving power and strength of the machine.

Very respectfully,
THE WILKIN MANUFACTURING CO.,
Per J. G. EMERY, JR.

The Kilby Manufacturing Co.

Niles Tool Works, Hamilton, O. CLEVELAND, O., March 28, 1889.

Gentlemen:—We have in use one of your 14-Foot Boring Mills with extensions to take in 20 feet in diameter, which has been in use in these works for the past five (5) years.

WE CAN NOT SAY TOO MUCH FOR THIS TOOL. Since the writer took charge of these works we have run it constantly day and night for the last seven or eight months, and have done work on the same which probably has never been done on this style tool before, FINISHING WORK OF MUCH LARGER DIAMETER THAN THE MILL WAS DESIGNED TO SWING, such as turning up twenty-six (26) feet diameter, fifty-four (54) inch face groove wheels for two (2) inch rope, and we have just finished a band wheel twenty-four (24) feet diameter by sixty-two (62) inch face, weighing thirty-six (36) tons.

THE TOOL IS VERY POWERFUL, has an ample range of speeds for the various sizes up to those named above, and is stiff and rigid under this heavy duty.

Very truly yours,
THE KILBY MANUFACTURING CO.,
J. F. KILBY, Manager.

The Ball Engine Company.

Niles Tool Works, Hamilton, O. ERIE, PA., October 21, 1890.

Gentlemen:—We are very glad to speak a good work for your 8-foot Boring Mill which you furnished us some two years ago. We consider it an excellent tool, and are perfectly satisfied with its performance. Yours truly, THE BALL ENGINE COMPANY.

B.

Buckeye Iron and Brass Works.

Niles Tool Works, Hamilton, O. DAYTON, O., October 16, 1890.

Gentlemen:—We have been using one of your improved 8-foot Boring Mills for the past fourteen months and we are very much pleased with it; in fact, entirely satisfied with its construction and with its operation. We only regret that we did not get one several years ago.

Very truly yours,

BUCKEYE IRON AND BRASS WORKS,

CHAS. C. PEASE, President.

Gaar, Scott & Co.

Niles Tool Works, Hamilton, O. RICHMOND, IND., October 14, 1890.

Gentlemen:—We are pleased to say that we have been using your new Boring Mill since last winter and have found it entirely reliable and efficient under all circumstances. It is SPEEDY AND ACCURATE in its work, easily managed and entirely satisfactory. Its value can hardly be over-estimated. Yours truly, GAAR, SCOTT & CO.

Lebanon Manufacturing Co.

Niles Tool Works, Hamilton, O. LEBANON, PA., October 20, 1890.

Gentlemen:—Your letter of the 13th of October is received and noted. In reply would say: In reference to the merits of the large Boring Mill furnished us in June, 1887, it has ever since been running nearly all the time, and has rendered very good satisfaction in all classes of work that we use it for, and we are well satisfied with the Boring Mill.

Yours truly,

LEBANON MANUFACTURING CO.,

JOHN HUNSICKER, Treasurer.

The Addyston Pipe and Steel Co.

Niles Tool Works, Hamilton, O. ADDYSTON, O., October 14, 1890.

Gentlemen:—We have had in service one of your 60-inch Lathes and 10-foot Boring Mills for the past three years, both of which machines have given satisfaction in every respect. The latter we consider THE FINEST TOOL ON THE MARKET. We shall be pleased to recommend your tools to any intending customer and show the machines that we have had in daily use. So far they have not required one cent spent on them in repairs. Yours truly, F. GANDY,

Superintendent.

Walker Manufacturing Co.

Niles Tool Works, Hamilton, O. CLEVELAND, O., December 26, 1890.

Gentlemen:—Replying to your favor of the 24th inst., will state that all the Boring and Turning Mills purchased from you during the past seven or eight years have given us great satisfaction, and have proven very efficient tools, and we take pleasure in recommending same to such as are seeking for the best. We have great expectations of the 16-24-FOOT MILL you are now building for us. We expect it to be the finest tool of its kind in the world.

With best wishes for your continued success, we remain,

Yours very truly,

THE WALKER MANUFACTURING CO.

By W. H. BONE.

Chicago Iron Works.

Niles Tool Works, Hamilton, O. CHICAGO, ILL., Dec. 10, 1889.

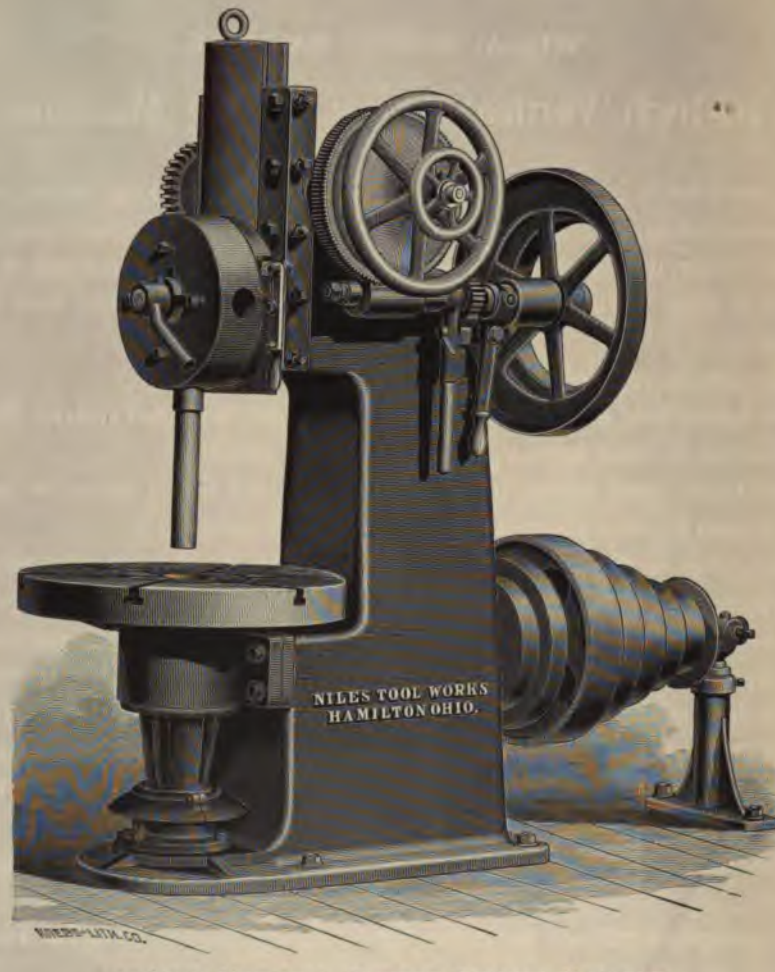
Gentlemen:—Since nearly a year ago we have had in constant use in our shops several of your machines, among them a 16-foot Boring Mill, Shafting Lathe, etc., and lately have added a 38-inch by 10-foot Planer. All tools, we are much pleased to say, are giving the best satisfaction. THE WORKMANSHIP ON ALL MACHINES IS EXCELLENT, AND THEY ARE STRONGLY AND SUBSTANTIALLY BUILT. We can highly recommend your work, and whenever in the market again for any of your tools you will have the first chance.

Very respectfully yours,
GAIL, BUMILLER & UNZICKER.

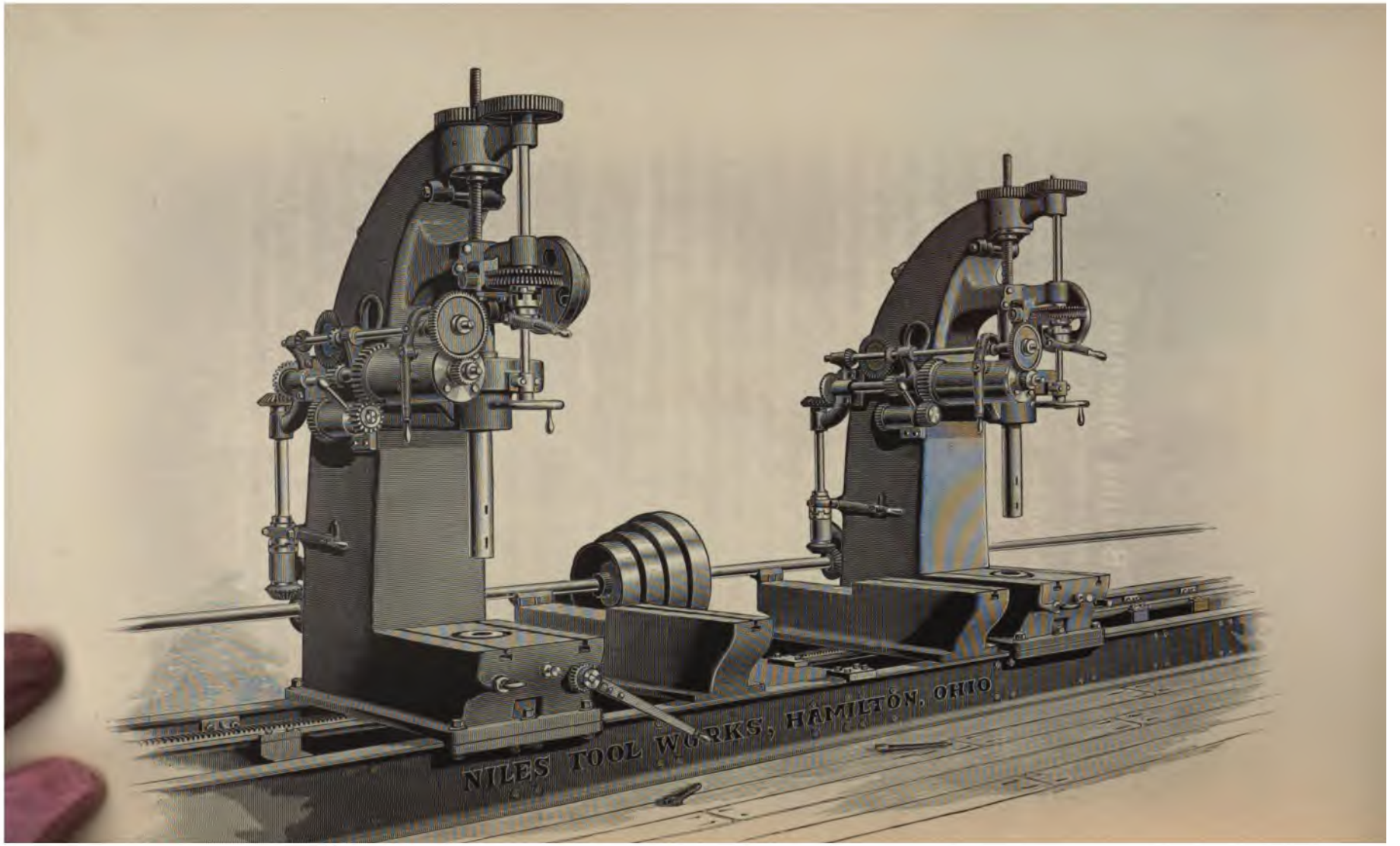
REFERENCES.

Fraser & Chalmers, Chicago, Ill.
P. H. Griffin Machine Works, Buffalo, N.Y.
Union Pacific R. R.
Brooks Locomotive Works, Dunkirk, N.Y.
Barnum & Richardson Co., Lime Rock, Conn.
American Ship Windlass Co., Providence, R. I.
A. Plamondon Manufacturing Co., Chicago, Ill.
Chicago Tire & Spring Works, Chicago, Ill.
Warder, Bushnell & Glessner Co., Springfield, O.
DeLavergne Refrigerating Mach. Co., New York.
Pennsylvania R. R. Co., Altoona, Pa.
Louisville & Nashville R. R.
Pennsylvania Steel Co., Steelton, Pa.
Otis Brothers & Co., Yonkers, N. Y.
New York, Lake Erie & Western R. R.
P. Pryibil, New York.
Ohio & Mississippi R. R.
Buckeye Iron & Brass Works, Dayton, O.
Ball Engine Co., Erie, Pa.
Hooven, Owens & Rentschler Co., Hamilton, O.
Gaar, Scott & Co., Richmond, Ind.
U. S. Navy Yard, Washington, D. C.
Stevenson & Co., Wellsville, O.
Harlan & Hollingsworth Co., Wilmington, Del.
Columbus Machine Co., Columbus, O.
Ludlow Valve Co., Troy, N. Y.
James Hunter & Son, North Adams, Mass.
Bucyrus Foundry & Machine Co., Bucyrus, O.
Fulton Iron Works, St. Louis, Mo.
Williams & Orton Mfg. Co., Sterling, Ill.
Colorado Coal & Iron Co., Pueblo, Col.
Chicago & Northwestern R. R., Chicago, Ill.
Denver Foundry & Machine Co., Denver, Col.
Speedwell Iron Works, Glasgow, Scotland.
Blackburn & Attenborough, Nottingham, Eng.
P. Van den Kerchove, Ghent, Belgium.
H. W. Butterworth & Sons, Philadelphia, Pa.
American Tool & Machine Co., Boston, Mass.
Flint & Pere Marquette R. R. Co., East Saginaw, Mich.
New York, Chicago & St. Louis R. R.
Wm. Cramp & Sons, Philadelphia, Pa.
Walker Manufacturing Co., Cleveland, O.
G. R. Lombard & Co., Augusta, Ga.
Smith & Sayre Mfg. Co., Newark, N. J.
Russell & Co., Massillon, O.
Vulcan Iron Works, Wilkesbarre, Pa.
C. Hegewald & Co., New Albany, Ind.
Leffel & Co., Springfield, O.
Nordyke & Marmon Co., Indianapolis, Ind.
C. & G. Cooper & Co., Mt. Vernon, O.
Litchfield Car & Mach. Co., Litchfield, Ill.
Joliet Steel Co., Joliet, Ill.
Denver & Rio Grande R. R. Co., Denver, Col.
Jones & Laughlins, Pittsburg, Pa.
Grand Trunk Railway, Montreal, Canada.
Central R. R. of Georgia, Savannah, Ga.
W. H. Tolhurst & Son, Troy, N.Y.
U. S. Navy Yard, Norfolk, Va.
H. Warden, Philadelphia, Pa.
Portland Locomotive Works, Portland, Me.
Morgan Engineering Co., Alliance, O.
Woodbury Engine Co., Rochester, N. Y.
A. & P. Roberts & Co., Philadelphia, Pa.
Taplin, Rice & Co., Akron, O.
Filer & Stowell Co., Milwaukee, Wis.
Weimer Manufacturing Co., Lebanon, Pa.
Birmingham Machine and Foundry Co., Birmingham, Ala.
Hill Clutch Works, Cleveland, O.
Stiles & Parker, Middletown, Conn.
Shickle, Harrison & Howard Iron Co., St. Louis, Mo.
Texas & Pacific Railway, Marshall, Texas.
Baltimore Car Wheel Co., Baltimore, Md.
V. Brasseur, Lille, France.
Ramapo Wheel & Fdry. Co., Ramapo, N.Y.
National Transit Co., Oil City, Pa.
R. D. Wood & Co., Philadelphia, Pa.

Union Fdy. & Pullman Car Wheel Works, Pullman, Ill.
New York Locomotive Works, Rome, N. Y.
Holyoke Machine Co., Holyoke, Mass.
J. S. Schofield & Sons, Macon, Ga.
Taper Sleeve Pulley Works, Erie, Pa.
Lynchburg Fdy. & Mach. Co., Lynchburg, Va.
Harrison & Co., Belleville, Ill.
Paige Car Wheel Co., Cleveland, O.
St. Paul, Minne. & Man. R. R., St. Paul, Minn.
R. L. Cofran, Topeka, Kas.
Hoffman & Billings Mfg. Co., Milwaukee, Wis.
Cin. & Newp't Iron & Pipe Co., Newport, Ky.
New Orleans & North Eastern R. R., Meridian, Miss.
Smith, Vaile & Co., Dayton, O.
Washington Iron Works, Seattle, W. T.
MacKenzie & Wilkes, Trenton, N. J.
J. E. Thropp, Trenton, N. J.
Hagan Steel Car Wheel Co., Three Rivers, Mich.
Chicago, St. Louis & Pittsburg R. R., Indianapolis, Ind.
Iowa Iron Works, Dubuque, Iowa.
H. K. Porter & Co., Pittsburg, Pa.
J. I. Case Threshing Machine Co., Racine, Wis.
Roanoke Machine Works, Roanoke, Va.
Thompson, Sterne & Co., Manchester, Eng.
Taylor Mfg. Co., Chambersburg, Pa.
Glamorgan Co., Lynchburg, Va.
Bartlett, Hayward & Co., Baltimore, Md.
Rodney Hunt Machine Co., Orange, Mass.
Dickson Mfg. Co., Scranton, Pa.
Cleveland City Forge & Iron Co., Cleveland, O.
Armington & Sims Engine Co., Providence, R. I.
Northern Pacific Terminal Co., Portland, Ore.
Cummer Engine Co., Cleveland, O.
Columbus Machine Co., Columbus, O.
Copake Iron Works, New York.
Watts & Campbell Co., Newark, N. J.
Thomas Prosser, New York.
Livesey Mfg. Co., New London, Conn.
Black & Clawson, Hamilton, O.
Louisville Car Wheel & Railway Supply Co., Louisville, Ky.
T. B. Wood & Son, Philadelphia, Pa.
Pittsburg, Cincinnati & St. Louis R. R. Co., Dennison, O.
Evansville, Terre Haute & Chicago R. R. Co., Terre Haute, Ind.
Gordon, Strobel & Laureau, Philadelphia, Pa.
Bass Fdry. & Mach. Works, Fort Wayne, Ind.
Cooke Locomotive & Mach. Co., Paterson, N. J.
Savannah, Florida & Western Railway., Savannah, Ga.
Ludwig Noble, St. Petersburg, Russia.
McDonough & Ballantyne, Savannah, Ga.
Lebanon Manufacturing Co., Lebanon, Pa.
Buckeye Engine Co., Salem, O.
Rogers Locomotive and Machine Works, Paterson, N. J.
Davis, Howe & Co., Salt Lake City, Utah.
Blymyer Mfg. Co., Cincinnati, O.
Novelty Iron Works, Dubuque, Iowa.
Macintosh, Hemphill & Co., Pittsburg, Pa.
Ottumwa Iron Works, Ottumwa, Iowa.
Richmond City Mill Works, Richmond, Ind.
Lockwood Mfg. Co., Boston, Mass.
Frick & Co., Waynesboro, Pa.
Midvale Steel Works, Philadelphia, Pa.
R. Wetherill & Co., Chester, Pa.
Atwood & McCaffrey, Pittsburg, Pa.
Chambers Bros. & Co., Philadelphia, Pa.
Gates Iron Works, Chicago, Ill.
J. Edwards & Co., New York.
Barney & Smith Mfg. Co., Dayton, O.
Hocking Valley R. R. Co., Columbus, O.
Wason Car Works, Chattanooga, Tenn.
Eagle Iron Works, Des Moines, Iowa.
Lidgerwood Mfg. Co., New York.
James Jackson, Denver, Col.
Stedman & Co., Aurora, Ind.
Geiser Mfg. Co., Waynesboro, Pa.
Rock Island Arsenal, Rock Island, Ill.
Stillwell & Bierce Mfg. Co., Dayton, O.
The Brownell Co., Dayton, O.
Bagley & Sewell Co., Watertown, N. Y.
W. H. Getchell & Co., Chicago, Ill.
The Edward P. Allis Co., Milwaukee, Wis.
Wilkin M'f'g Co., Milwaukee, Wis.
James Rees, Pittsburg, Pa.
Robert Poole & Son Co., Baltimore, Md.
Carnegie, Phipps & Co., Pittsburg, Pa.
Ranken & Fritsch Foundry and Machine Co., St. Louis, Mo.
Franklin Sugar Refining Co., Philad'a, Pa.
Stirling Co., New Portage, O.
Phoenix Iron Works Co., Meadville, Pa.
Ajax Iron Works, Corry, Pa.
Lewis F'd'y and Mach. Co., Pittsburg, Pa.
Illinois Central R. R., Chicago, Ill.
Webster Manufacturing Co., Chicago, Ill.
Chesapeake Dry Dock Co., Newp't News, Va
S. Morgan Smith, Philadelphia, Pa.
Leffel Water Wheel and Engine Co., Springfield, O.
Watervliet Arsenal, West Troy, N. Y.
Texas State Penitentiary, Rusk, Texas.
Sheffield Velocipede Car Wheel Co., Three Rivers, Mich.
St. Louis & San Francisco Ry., Springfield, Mo.



30-INCH VERTICAL TURRET BORING MACHINE.


NILES TOOL WORKS, HAMILTON, OHIO

Chord Boring Machine.

FOR BORING BRIDGE CHORDS AND "I" BEAMS.

THIS machine is far heavier and stronger than is usually furnished for double chord boring.

In this class of work it is essential that the two spindles shall be exactly parallel in all positions, and failure to accomplish this has caused some feeling of distrust against all double machines. We have, however, built several of these machines, carefully designed to meet this very objection, and they are in all instances giving complete satisfaction. It is essential that the bed shall be carefully leveled on a solid foundation. If this is rightly done the two spindles will work together with the utmost precision.

Arranged with two independent heads on one bed, adjustable on the bed for varying lengths. The bed may be made of any length to suit.

The two heads are complete in themselves, driven independently, and with all attachments, feeds, etc., for a complete boring machine. They are of great strength and power. The power is ample for boring four holes, punched 4 to 8 inches diameter, at one time, and the range of speed is such as to adapt the machine for drilling down to 1½-inch holes.

The two columns have both power and hand movement for adjustment on the bed.

The heads have 18 inches reach, boring to the center of 36 inches. They will take in under the cutter work 36 inches high.

Spindle has 24 inches traverse.

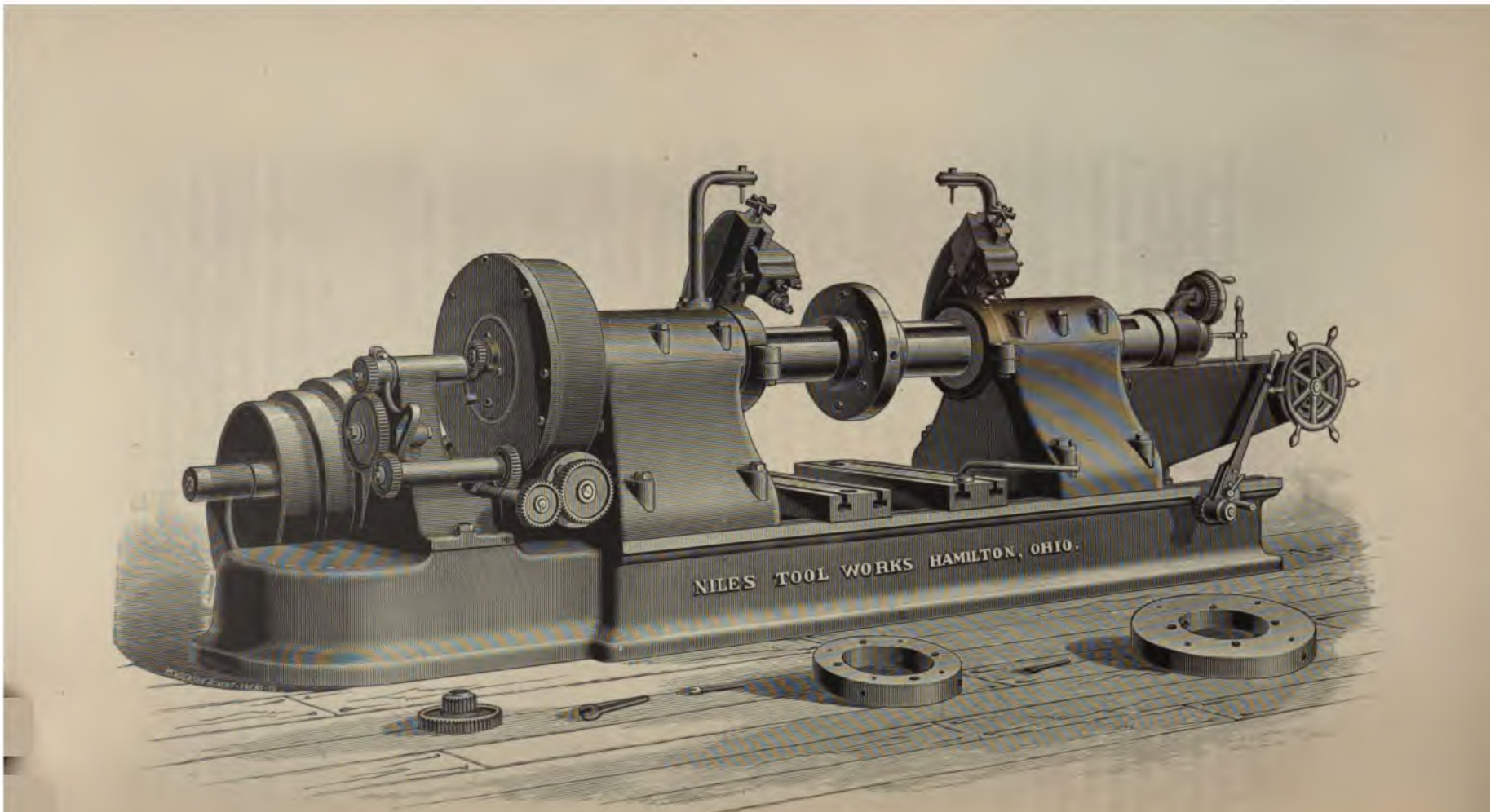
Range of work in length, 5 to 50 feet between centers.

Feeds are by power, and are reversible up or down, and range from $\frac{1}{40}$ to $\frac{1}{12}$-inch for heavy work, and coarser feeds for light work.

The bed is formed of wrought iron "I" beams, 15 inches deep.

Two independent carriages for supporting work on the bed are provided.

The countershaft has three pulleys 26 inches diameter. Outside pulleys 11 inches face, center pulley 6½ inches face. Speed, 200 revolutions. Use 6-inch belt for driving spindles, 4-inch crossed belt for traversing columns on bed.



NO. 2 CYLINDER BORING MACHINE.

Cylinder Boring Machines.

THESE machines are built in several styles to suit the varying practice of locomotive and stationary engine shops. The distinguishing feature in each style, aside from nominal capacity, is the manner in which the boring bar is operated. In one style the bar is simply held between centers. It has a sliding head operated by means of a feed screw and gears at one end. Another style, illustrated on opposite page, has the bar attached to the tail stock and arranged to be withdrawn. In this form, also, the bar is provided with a sliding head and feed screw. In the third style the head is clamped to the bar and moves with it. In all styles the bar is driven by tangent gearing.

No. 1 Cylinder Boring Machine.

FOR BORING LOCOMOTIVE CYLINDERS.

WILL bore cylinders from 16 to 22 inches diameter.

The boring bar is 8 inches diameter. Power is transmitted through tangent gearing, affording a very smooth, even motion to the boring bar, particularly desirable in cylinder boring and work of a similar character. Cylinders bored in this manner have a very smooth finish. The cone has three speeds for a belt 4 inches wide. The boring head is traversed on the bar by means of a screw.

There are five changes of feed, ranging from $\frac{1}{32}$ to $\frac{3}{8}$ of an inch.

Two boring heads are furnished with the machine, for large and small cylinders. Heads are also furnished for facing and turning the flanges of cylinders.

The time required for boring cylinders is reduced to a minimum by the use of this special machine. The countershaft has two pulleys 28 inches diameter, 4½ inches face. Speed of countershaft, 125 revolutions per minute.

No. 2 Cylinder Boring Machine.

FOR BORING AND FACING LOCOMOTIVE CYLINDERS.

THE cut on the opposite page represents this machine as arranged for cylinders 28 inches diameter and 39 inches long, including sinking head. In this machine the boring bar is withdrawn from the work by a rack and pinion movement attached to the tail stock. The boring head is traversed on the bar by a screw. Facing heads are provided, attached to sleeves on the head and tail stocks.

The boring bar is 9 inches diameter. Power is transmitted through tangent gearing, which insures a steady motion to the bar and freedom from chatter.

The feed is obtained by change gearing, and is connected and disconnected by a clutch engaging with the feed screw in the boring bar. This clutch is operated by a lever at the end of the bar, within easy reach of the operator. Two boring heads are furnished with the machine, for large and small cylinders.

Countershaft has two pulleys 28 inches diameter, 4½ inches face, and should run 125 revolutions per minute.

No. 3 Cylinder Boring Machine.

FOR BORING AND FACING STATIONARY ENGINE CYLINDERS.

THIS machine is similar in design to the No. 2, heretofore described. It is intended for boring and facing stationary engine cylinders up to 36 inches diameter and 60 inches long, boring and facing both ends at the same time.

The boring bar is operated by rack and pinion movement on the tail stock. It has four feeds operating in both directions. The head is arranged to be set by hand adjustment, shown above the bar in the preceding illustration.

The driving cone has four steps for a 5-inch belt, and drives the bar by means of tangent gearing, insuring smooth and steady action.

Facing heads are clamped to sleeves revolving with the bar, and when not in use may be unclamped and remain stationary.

The tail stock is adjustable on the bed, to suit cylinders of different lengths.

Two saddles are provided, which extend across the bed and are clamped to it. These are for holding the work.

The facing head on the head stock is driven by the sleeve which drives the boring bar, so that if desired the tail stock and bar can be removed and engine frames can be placed on the saddles and be faced up to receive their cylinders. By using a special bar in the sleeve the stuffing boxes could also be bored.

NOTE.—Both the No. 3 and No. 2 Cylinder Boring Machines previously described, can be arranged with the cutter head clamped on the bar, in which case the bar is fed by rack and pinion back of the head stock. This arrangement is quickest in manipulation, but occupies a great deal more room and is far more expensive.

No. 4 Cylinder Boring Machine.

FOR BORING AND FACING STATIONARY ENGINE CYLINDERS.

THIS machine will bore cylinders up to 60 inches diameter, and any length that may be desired. It consists of large head and tail stocks mounted upon a heavy bed, which is set level with the floor.

The boring bar is held between centers, as in ordinary lathe practice, while the boring head is fed along the bar by means of a feed screw and gears at one end.

The spindle is very large and is driven by means of tangent gearing, in the same manner as all the foregoing Cylinder Boring Machines.

This machine is provided with a large face plate, with a facing head operated by star wheel feed. It can be quickly removed, and work can then be fastened upon the face plate and be operated upon as in ordinary lathe practice.

This machine is very powerful, yet extremely simple in its construction. One firm of engine builders who are using one of them say it has reduced the cost of cylinder boring and facing to less than one-half of former cost.

No. 5 Cylinder Boring Machine.

FOR BORING CYLINDERS, FACING ENDS, AND BORING VALVE PORTS OF CORLISS ENGINE CYLINDERS.

THIS machine is similar in design to the No. 3 machine before described, *i.e.*, the arrangement of the boring bar and facing heads is the same, and all the manipulations are under the same easy control of the operator. The distinguishing feature, however, is that in addition to the boring bar and facing heads, a pair of auxiliary columns are located on extensions in front and back of the bed, and adjustable thereon to any required position. One of these columns has a saddle arranged to slide vertically upon it, carrying a boring spindle to which power is communicated from an independent countershaft. Upon the other column a knee is mounted, carrying an outboard bearing for the bar.

Automatic feed and quick hand adjustments are provided.

With this arrangement advantage is taken of the setting of the Corliss cylinder for boring, to bore the valve ports at the same time. This saves one handling, insures the valve ports being square with the cylinder, and saves the time which would otherwise be consumed in boring the ports, as there is always ample time to do this while the other operations of boring and facing are going on.

This machine is capable of boring cylinders up to 42 inches diameter and 10 feet long.

Two bars are furnished, one 7 inches diameter for cylinders up to 18 inches, the other 12 inches diameter for cylinders above that size.

The machine is driven by powerful tangent gearing, in the same manner as all the foregoing Cylinder Boring Machines.

Horizontal Boring and Drilling Machines.

AMONG the many labor-saving tools now coming into general use in our best shops, none occupy a more prominent position, or are held in higher esteem, than the Horizontal Boring and Drilling Machine.

As a general utility machine it fills a space which can be occupied by no other tool. It will bore; it will drill; it will face, ream or mill.

With its closely fitted, accurately adjusted slides it will bore or drill holes with all the accuracy of an expensive jig, and this, too, whether the axis of the holes lie in parallel or angular planes.

It supplements the heavy milling machine, in that the latter class of machines are arranged more particularly to work at right angles to the axis of the spindle, while this machine has much greater range in line with the spindle, and also in vertical distance from it.

It is a much better machine for accurate boring than either the lathe or drill press, since the table and cross slides are readily adjustable to the fixed position of bar or drill, without the use of blocking.

As a machine for setting feathers in shafts, or milling slots in work, it fulfills the functions of planer, slotter or cotter drill.

Where parallel holes are to be bored in a number of pieces, the use of stops on the slides will save the expensive laying out by the fitter.

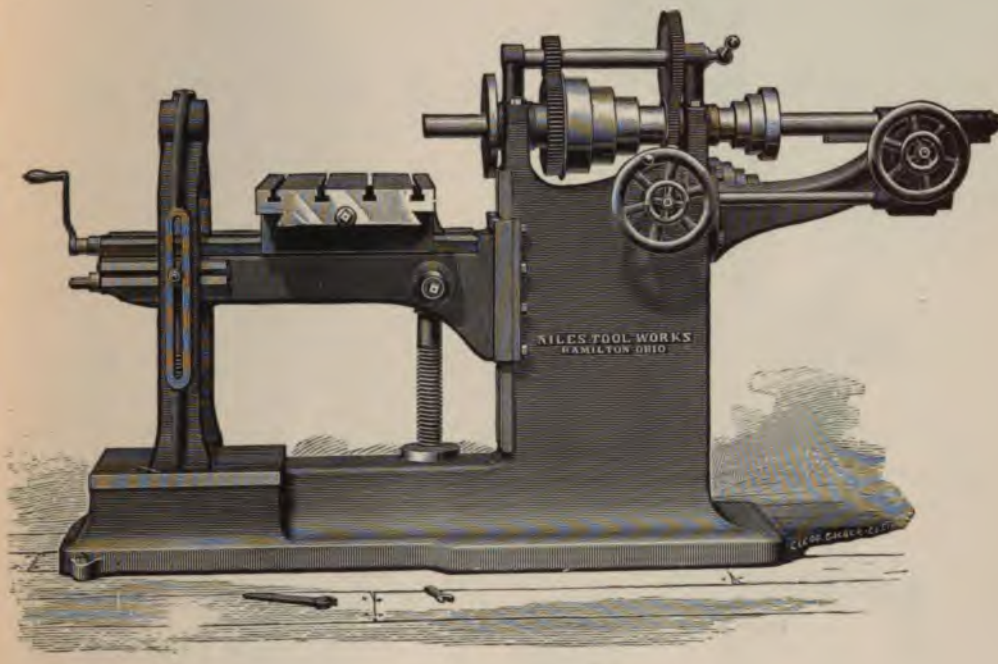
We make these machines in four sizes. They are all of the same general design as shown in the cut, and consist essentially of a heavy column mounted on a rigid base and carrying the boring spindle and feed gear.

An adjustable table is gibbed securely to the face of the column. It is supported upon, and also raised and lowered by, two screws of large diameter, connected by a horizontal shaft and bevel gearing.

The table carries a saddle and cross table with compound movement. The spindle has rapid hand movement by rack and pinion.

The revolving sleeve surrounding the spindle has a face plate to which a head for facing may be attached.

The outer end of the boring bar is supported by an adjustable yoke, which also affords additional support for the table, and can be removed when desired.



No. 1 Horizontal Boring and Drilling Machine.

WILL bore to the center of a 48-inch circle.

This machine has been designed to meet the wants of the trade for a tool of medium size, but of ample power to do good work rapidly.

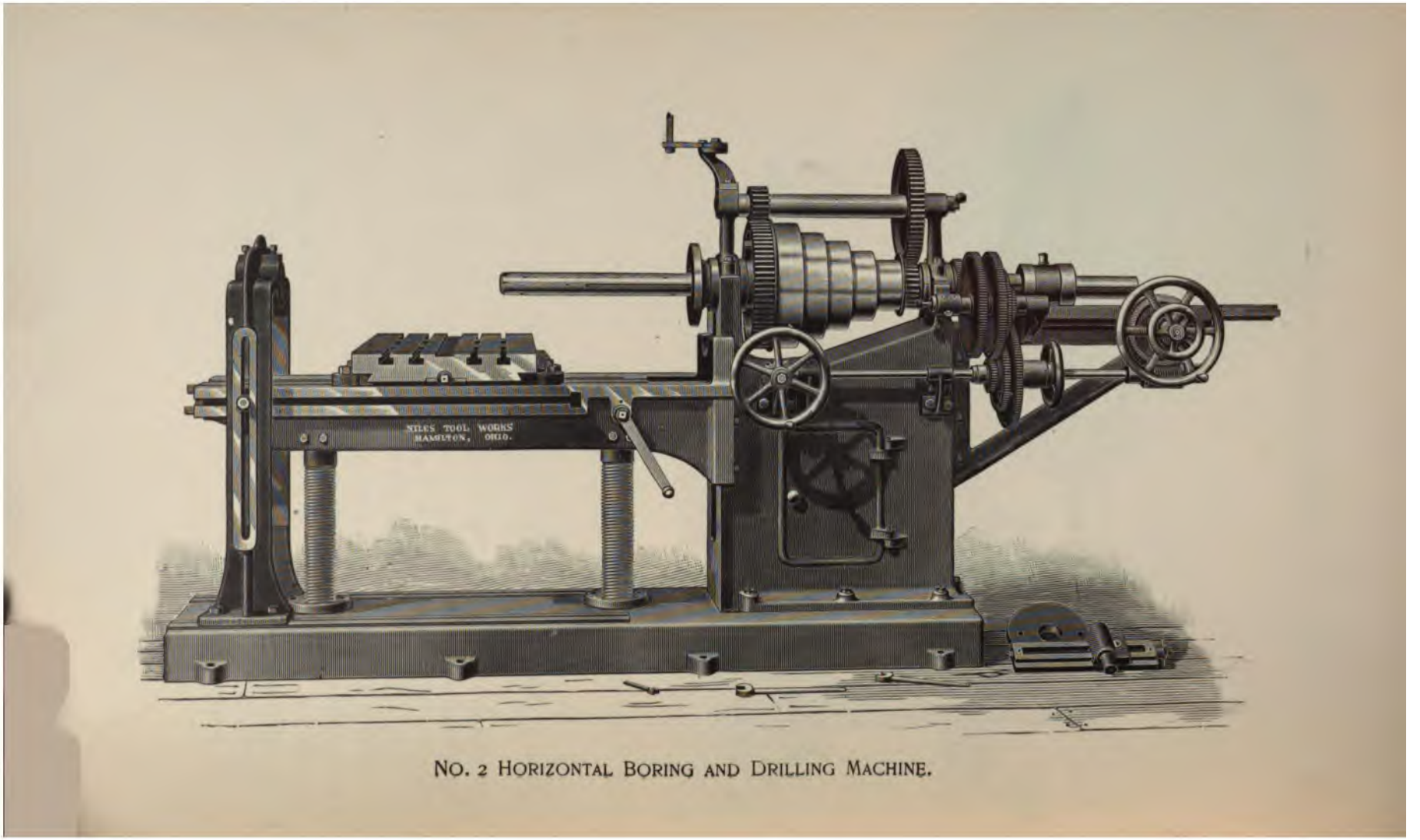
Driving cone has four steps for 2½-inch belt.

Spindle is of steel, 2½ inches diameter, and has 17 inches traverse. This, with the traverse of the table, will bore holes 36 inches long.

Table is 51 inches long. Cross table is 19x40 inches. Longitudinal traverse of cross table, 26 inches. Transverse movement is also 26 inches.

Countershaft pulleys are 16 inches diameter, 3½ inches face.

Speed, 96 revolutions.



NO. 2 HORIZONTAL BORING AND DRILLING MACHINE.

No. 2 Horizontal Boring and Drilling Machine.

WILL bore to the center of a 60-inch circle.

The driving cone has five speeds for a 3½-inch belt, ranging from 7 to 18 inches diameter. It is strongly back geared, giving ten changes of speed to the boring spindle.

The spindle is of steel, 4 inches in diameter, and has a traverse of 54 inches, obtained by two settings of the spindle. There are three changes of feed by gearing, operated by an internal clutch.

The table is 6 feet long. The cross table is 24 inches wide by 58 inches long.

Longitudinal traverse of cross table is 36 inches. Transverse movement is 38 inches.

Countershaft pulleys are 22 inches diameter, 5 inches face.

Speed of countershaft, 75 revolutions per minute.

No. 3 Horizontal Boring and Drilling Machine.

WILL bore to the center of a 66-inch circle.

Driving cone has five speeds for a 3½-inch belt, and is strongly back geared.

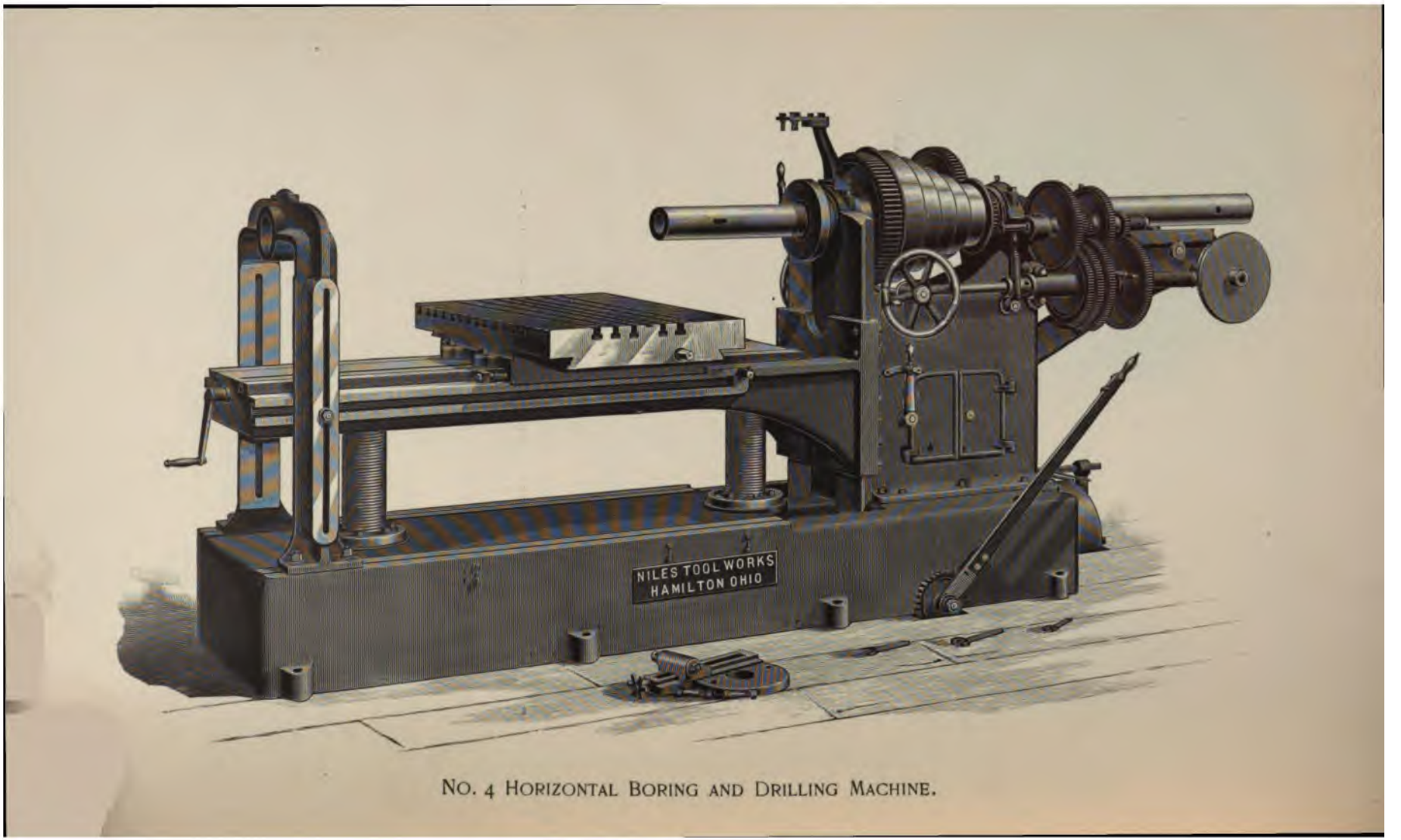
Boring spindle is of steel, 4 inches in diameter, and has a traverse of 60 inches, obtained by two settings. There are three changes of feed by gearing, operated by an internal clutch.

The table is 8 feet long. It is raised and lowered by power.

The cross table is 24 inches wide by 58 inches long. Longitudinal traverse is 60 inches. Transverse movement is 38 inches.

Countershaft pulleys are 22 inches diameter, 5 inches face.

Speed of countershaft, 75 revolutions.



NO. 4 HORIZONTAL BORING AND DRILLING MACHINE.

No. 4 Horizontal Boring and Drilling Machine.

WILL bore to the center of a 72-inch circle.

The driving cone has five steps, ranging in diameter from 8 to 20 inches, for a belt 4 inches wide. The cone is strongly back geared, affording ten changes of speed to the boring spindle. The spindle has 72 inches traverse, obtained by two settings, each with 36 inches automatic traverse.

There are three changes of feed by gearing, operated by an internal clutch.

In addition to the feed of boring spindle, the compound table has automatic feed with three changes.

The spindle and table feeds may be used together or separately as desired. By using the two feeds together a very coarse feed is obtained for finishing cuts, thus increasing very materially the amount of work the machine is capable of performing.

The spindle has quick-return movement by hand-wheel and pinion, connected with feed rack. The revolving sleeve surrounding spindle has a face plate to which a head for facing may be attached.

The table is 9 feet long, and is raised and lowered by power through the elevating screws, which are 7 inches diameter. The table is provided with saddle and cross table, with compound movement, and, as stated above, power feed.

The outer end of the boring bar is supported by an adjustable yoke, which also affords additional support to the table, and can be removed when desired.

The countershaft pulleys are 20 inches diameter, 5 inches face.

Speed of countershaft, 100 revolutions per minute.

Double Boring Machine.

DESIGNED FOR BORING DUPLEX PUMPS, BORING BOTH CYLINDERS AT THE SAME TIME

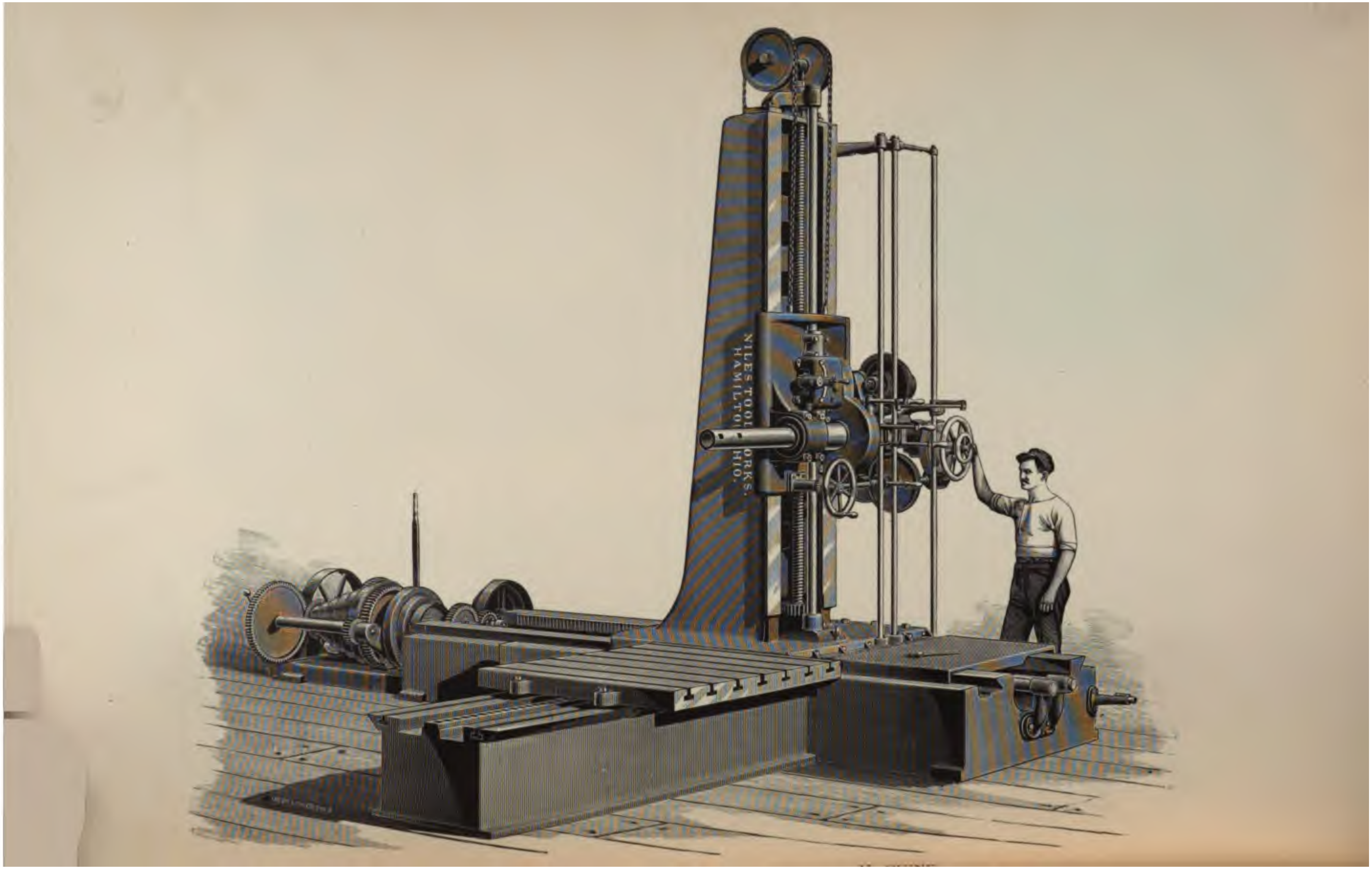
A HORIZONTAL machine with two spindles in the head stock. Spindles do not traverse but are adjustable between centers. The spindles are driven by worm gearing, insuring great power and steadiness under the cut.

Will bore cylinders up to 8 inches diameter, and face the flanges.

The spindles can be set to within 5½ inches between centers, and moved apart to 10½ inches between centers. Distance from the center of spindle to top carriage is 12½ inches. Carriage 6 feet long. Bed 12 feet long. Will take in work 6 feet long. Carriage has two changes of power feed, operated by gearing. Powerful hand feed is also provided.

The feed is reversible, and has quick return by hand motion.

Driving cone has three steps for 3½-inch belt. Countershaft has two speeds, giving six changes of speed.


NILES TOOL WORKS.
HAMILTON, OHIO.

Horizontal Boring, Drilling and Milling Machine.

THIS machine, as its name implies, is designed for all classes of boring and drilling, and in addition has ample power and the necessary feeds for milling. For the latter service the machine is especially valuable, doing work that otherwise would require a large planer.

The spindle covers a very large surface, reaching any point in a surface 9 feet or more in length by 6 feet in height. Consequently it will finish very large work, and the piece requires but little handling. In most cases all surfaces may be milled off and holes drilled or bored in a piece with one setting. Economy of operation on very large work has to do almost entirely with the saving in expense of handling. Frequently the operation to be performed by the machine is a short one, and the time handling the piece to get it into position requires by far the greater expenditure of time and consequent expense.

To plane a piece, say 9x6 feet, would require a very large planing machine, which means a heavy investment. This is reduced materially by the machine illustrated. In a planer the work is carried forward and back, requiring large power to move the piece alone, and a loss of time in reversing. With this milling tool the piece remains stationary, the tool moving up to its work, and the cut is continuous.

The advantages of such a machine for milling are more novel, but no greater than for the operations of drilling and boring. The same advantages in reaching the work, without extra handling of the piece being operated on, are obtained. In addition are the recognized advantages of boring and drilling with a horizontal spindle. The work resulting is most accurate. Holes are drilled in line, when necessary, and easy adjustment of the spindle is attained.

In this machine the spindle is extra large, has a wide range of speeds and feeds, and may be run in either direction, either right or left-hand.

Various styles of tables, or floor plates, for securing work can be used. One of these, a square table, is shown in the cut.

These are placed in front of the machine and may consist of plain floor plates of cast iron planed true and T slotted. Or a compound table may be used with traverse by screw in both directions. Or, in addition to the compound table, a circular motion may be added.

We furnish tables, or the user may provide such as may be best suited to his work.

Some of the advantages of this tool may be learned from the following statement of work done at the shops of Gordon, Strobel & Laureau, Philadelphia. The following is an extract from a letter from them.

"The tool which especially meets our approval is the Horizontal Milling and Boring Machine. The spindle carrying the drill or drilling head may be projected a distance of 48 inches from the face of the machine. It has a horizontal movement of 108 inches and a vertical one of 72 inches. These limits cover a wide range of work. For instance, in machining the bed plate of a blowing engine, we support the casting vertically in front of the machine, face the bearings for housings and for the steam cylinder, mill the seats for the pillow block caps, treating the various heights, or levels, and directions without change in the position of the bed plate. The latter is then lowered to a horizontal position and we proceed to bore out the main bearings. Likewise the blowing engine housings, after being bolted firmly together and to stools, are machined and drilled to gauge in a remarkably short time. In all the foregoing, parallelism of surface is insured. We bore out each air valve seat in our blowing cylinder heads, reaching each and every one without change, the head being 9 feet 6 inches in diameter.

"Our patented tuyere stocks require spherical joints, which must be machined accurately. These joints we get with one cut, accomplishing the same quickly by means of a simple cutter head attachment to the milling tool spindle.

"Enough has been said to exemplify the wide range of the tool. It is the first eminently good step out of the old range of lathe, planer, etc., etc., that is applicable to general work."

General Description.

THE machine consists of a heavy column, 10 feet 6 inches high, mounted on a bed plate of any length to suit requirements. The column is moved along the bed plate by power, operating through worm gear and rack. The column is 31 inches wide on the face and is fitted with a heavy saddle 40 inches square, carrying the spindle.

The saddle has a vertical traverse on the column of 6 feet, and is raised and lowered by heavy screw. It is balanced by counterweight hung in the column.

Boring and milling spindle is hammered steel, 5½ inches in diameter. It slides in a heavy, revolving sleeve, and has a traverse of 4 feet. It revolves in either direction, right or left-hand, reversing by lever conveniently located, and has eight power feeds ranging from $\frac{1}{20}$-inch to $\frac{1}{4}$-inch per revolution of spindle. It is also provided with hand feed and quick return.

The milling feeds are six in number, ranging from $\frac{1}{12}$-inch to $\frac{9}{16}$-inch per revolution of spindle. These feeds are applied only to the column and saddle, and are by power only.

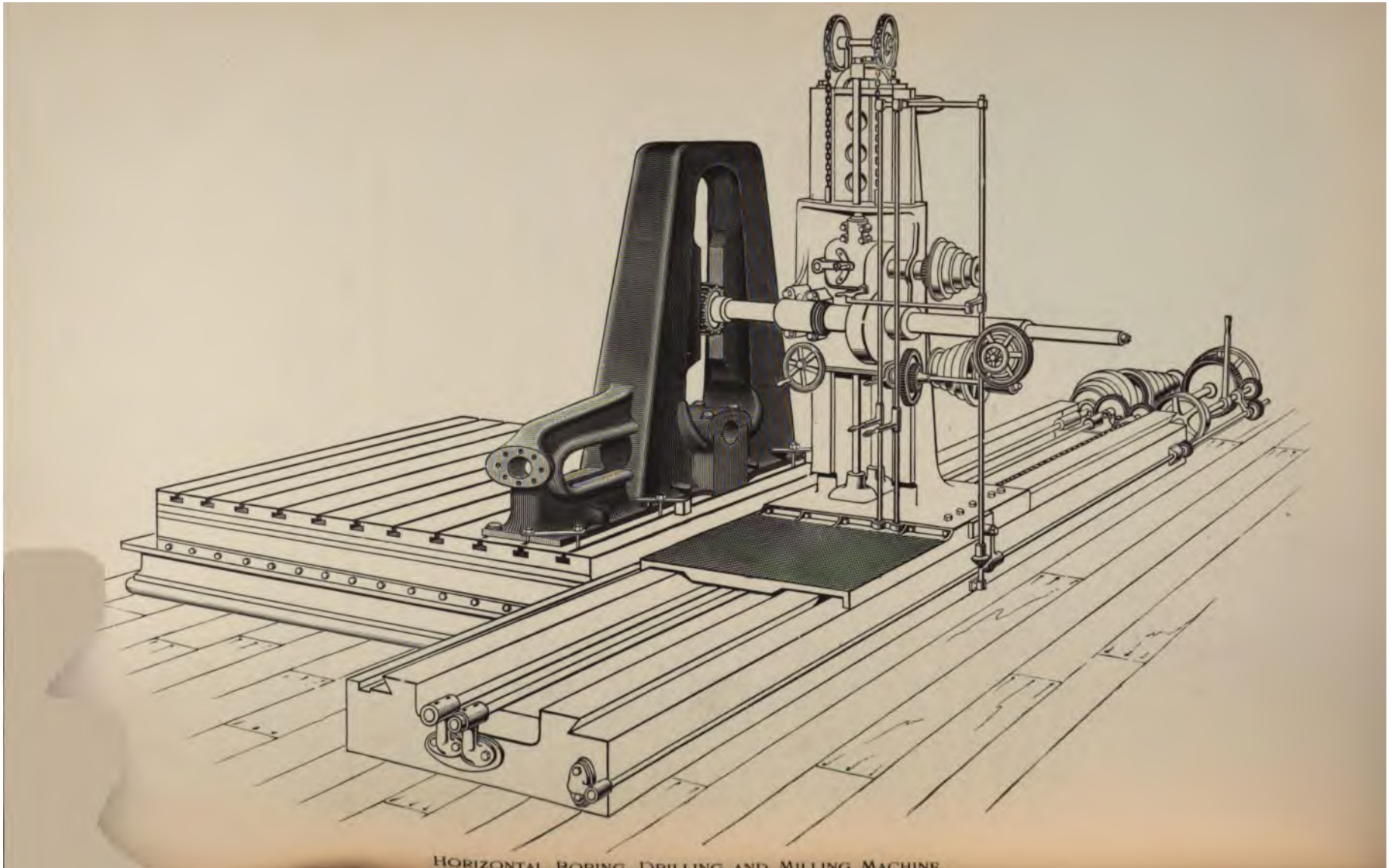
Any of these feeds for the quick motion may be utilized to set a drill, boring bar or milling cutter to work anywhere on the surface which the machine will reach.

At one end of the bed plate is placed the driving gear, milling feed and quick traversing mechanism for the column. The quick power traverse of the column has a speed of 5 feet per minute.

The driving cone has six steps for a 4-inch belt, and is strongly back geared, giving twelve changes of speed ranging from 2 to 200 revolutions per minute, and has ample power for boring up to 24 inches diameter.

A platen is placed in front of the column, convenient to the spindle, for the operator to stand on, and all movements of the spindle, saddle and column may be started, stopped or reversed by levers conveniently arranged on, and traveling with the saddle, within easy reach of the operator while he watches the work.

Countershaft and wrenches are furnished.



HORIZONTAL BORING, DRILLING AND MILLING MACHINE.

Horizontal Boring, Drilling and Milling Machine.

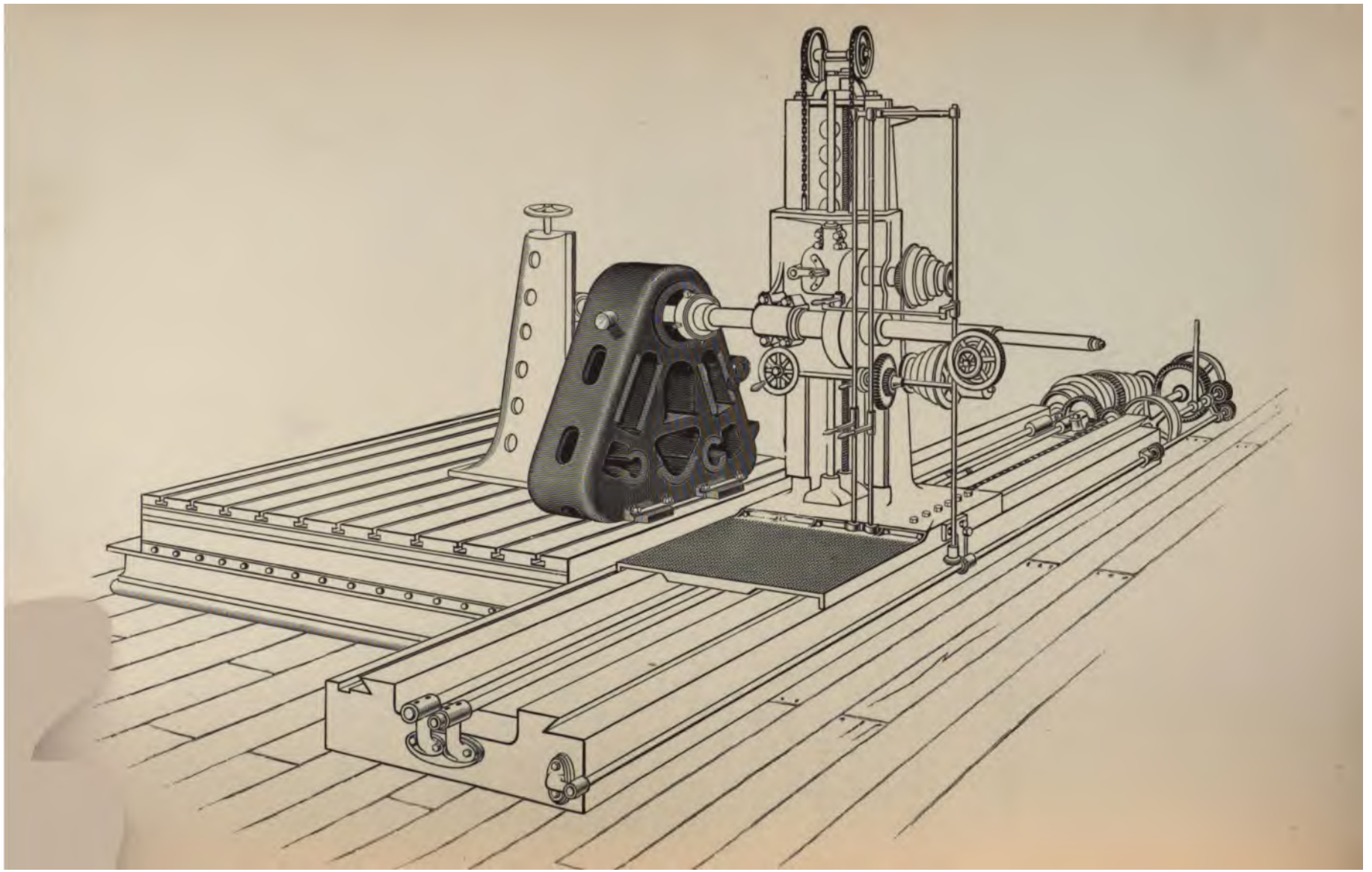
MILLING CROSS HEAD GUIDES IN A LARGE ENGINE "A" FRAME.

IN order to show some of the advantages which this machine possesses for operating quickly on large, unwieldy work, we present herewith a few examples which, it will at once be seen, would require considerable handling and expense to finish in any other manner.

The first example we present is that of an "A" frame for a vertical engine, such as are used, for instance, in many ice machines.

The machine is here shown milling the cross head guides. To do this on a planer would require a very large machine, which takes up a large amount of floor space and involves a considerable outlay, while in this way the frame is simply picked up by a traveling crane and placed in proper position in front of this machine, close up to the column. A milling head is then keyed to the spindle and the saddle set to feed vertically on the column. In this manner both guides may be milled.

A facing head is then put on in place of the mill, and the guides faced up on both sides. After this is done the main and rocker arm bearings, etc., may be bored and faced. All this, together with the drilling and tapping for brackets, etc., may be done at one setting, as the machine is provided with all the necessary movements to bore or face in any required position, or to mill in either horizontal or vertical planes.



Horizontal Boring, Drilling and Milling Machine.

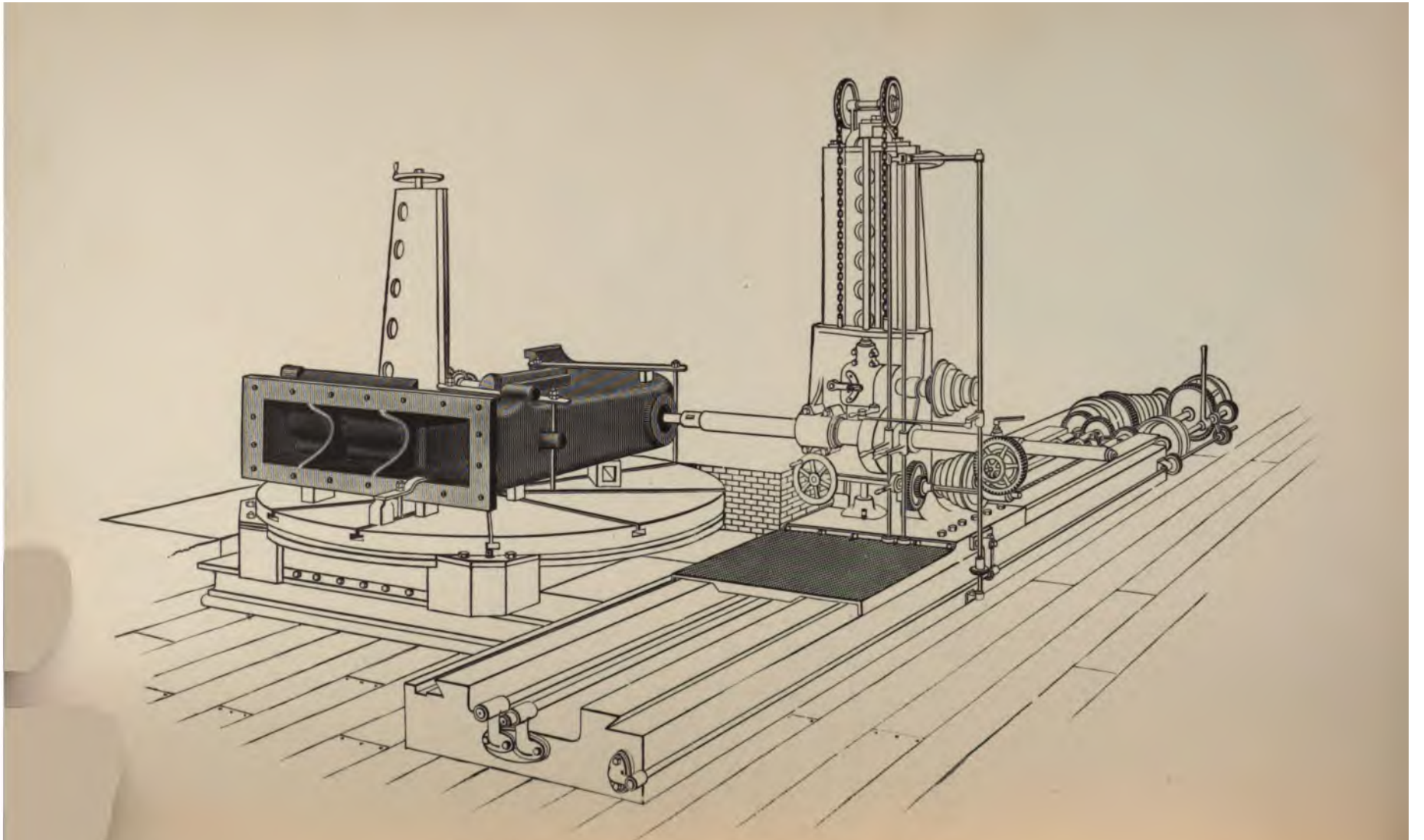
FINISHING HOUSING FOR LARGE BENDING ROLLS.

THE illustration on the opposite page shows this machine boring the main roll bearing in a large housing for bending rolls.

In this case the housing was placed upright on the table and secured firmly, close to the column of the machine.

We rely generally upon securing the work firmly to the table or floor plate without the use of braces, if possible, as they are most apt to cause springing, which will result in the work being out of true. In this case the housing was clamped by its feet only, and was stiff enough to withstand very good cuts. The cutter head shown was then secured to the spindle and the main bearing finished. All the remaining holes, bosses and surfaces were then bored, faced, drilled or tapped in succession at the same setting.

It will at once be apparent what a great saving in time is effected in this manner over those processes requiring successive setting of such heavy pieces.



HORIZONTAL BORING, DRILLING AND MILLING MACHINE.

(Finishing a large Slotter Column on Revolving Table)

Horizontal Boring, Drilling and Milling Machine.

FINISHING A LARGE SLOTTER COLUMN ON REVOLVING TABLE.

THE accompanying illustration presents another example of work with this machine, drawn from our own practice.

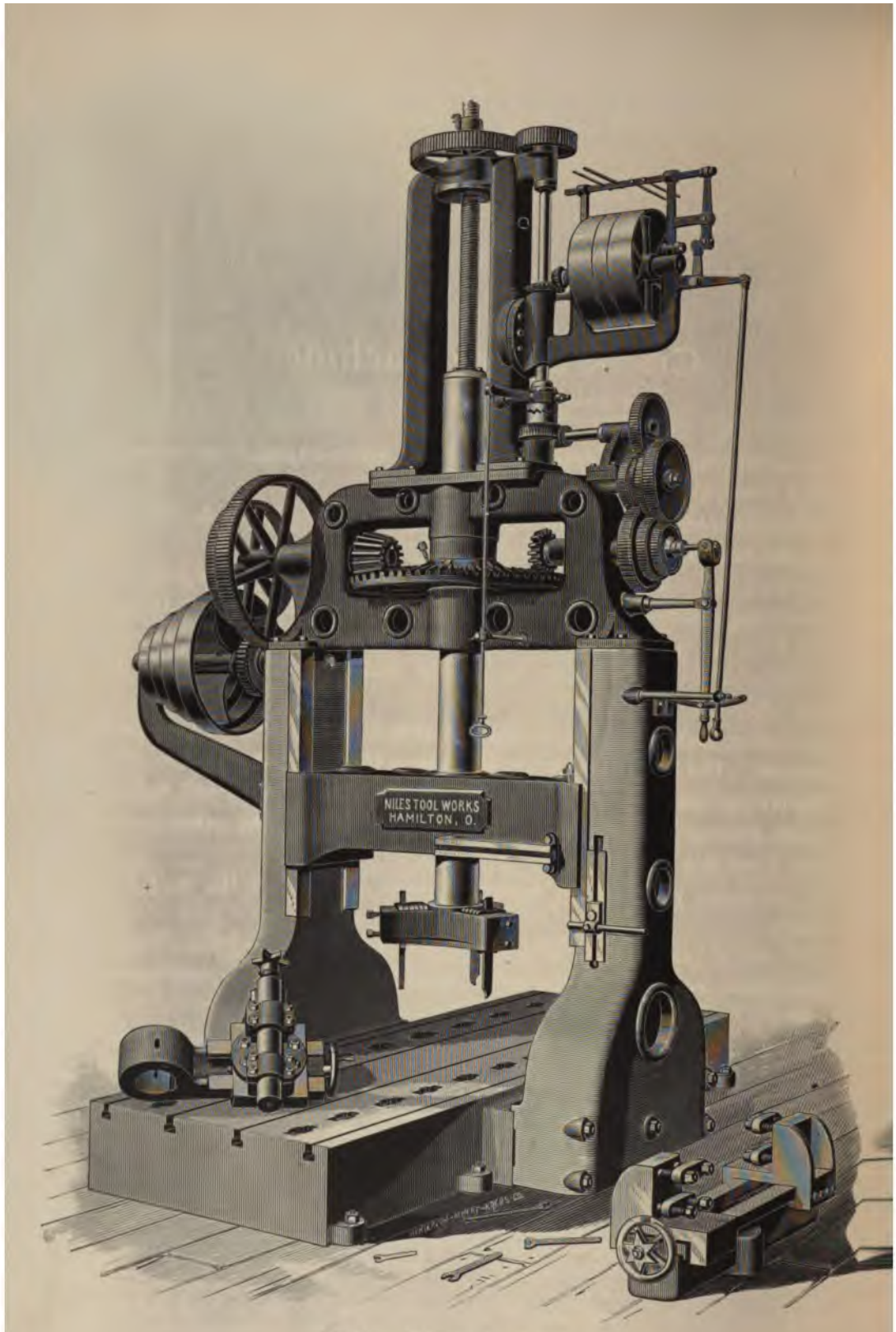
This example illustrates a large class of heavy work upon which it is necessary to operate on several angular planes. For work of this class the table should be a compound one with circular movement. We furnish these with power movements in all directions.

The rough or planed casting is securely bolted to the table in such manner as to present most of the surfaces which are required to be operated upon, by simple revolution of the compound table. This table is graduated, and thus it will be seen that the various holes and surfaces can be set with the greatest accuracy.

The successive surfaces are then treated as presented in the manner previously shown, according to requirements.

In the example shown, which is one of our slotter columns, if it had been required to face the base of the column to fit it to the bed (as is done on the large sizes), a milling cutter could be passed entirely around the base at one cut, and then the necessary bolt holes drilled, all at one operation.

It is hoped that these examples will serve to show how easily, quickly and accurately large castings can be treated by this machine.



CRANK BORING MACHINE.

Crank Boring Machine.

FOR BORING CRANKS AND SIMILAR WORK.

THIS machine is specially designed for boring heavy forgings and cutting out holes from solid forgings.

Bed 12 feet long. Will take in work 5 feet under cross rail, and 5 feet between the housings.

The cross rail is adjustable vertically so as to bring it close to the work.

The boring spindle is of steel, 8 inches diameter, and has five feet traverse.

The feeds are operated entirely by gearing; no belts are used. There are three changes of feed, which may be quickly made by in-and-out pin without changing wheels.

The boring spindle has quick return, operated by power from independent countershaft. The same power raises and lowers the cross rail.

The boring spindle has three large and long bearings, all fitted with bushings. The lower bearing is 8 inches diameter, 15 inches long. All other bearings requiring it are also bushed.

All necessary provision for taking up wear is made in the feed nut of the spindle.

Two sets of gearing are provided to give a range for boring holes from 2 to 22 inches diameter. The gearing is all very strong and heavy, and cut from the solid.

For the operation of taking out the core of large size cranks this machine is peculiarly well adapted.

A head for facing is provided. When in use this head is fitted to the spindle. It carries two tool heads provided with power feed. Will face off work up to 44 inches diameter.

TESTIMONIALS AND REFERENCES.

TESTIMONIALS.

Morgan Engineering Co.

Niles Tool Works, Hamilton, O. ALLIANCE, O., Aug. 26, 1890.

Gentlemen:—We are in receipt of your favor of the 20th inst., and it gives us great pleasure to say that the Horizontal Boring, Drilling and Milling Machine which we bought from you over a year ago, is one of the finest tools we have ever seen and has done us splendid service.

A large amount of the heavy work of a complicated character that we have done on this machine has been of great value to us. We are only sorry that we did not order it sooner from you. The usefulness of such a tool to any engineering workshop doing heavy work is nearly indispensable, as its name indicates. We now feel that it would be impossible for us to get along without it.

We hope that the Horizontal Boring Machine which you are now about shipping to us, and which is of another class, will give us as good satisfaction as the one we now have, and we shall be highly pleased, we assure you. Yours truly,

MORGAN ENGINEERING CO.,
T. R. MORGAN, SR., Pres't and Treas.

Gordon, Strobel & Laureau, Limited.

Niles Tool Works, Hamilton, O. PHILADELPHIA, Feb. 22, 1889.

Gentlemen:—Replying to your inquiry of the 7th inst., asking how we are pleased with the large lot of tools we recently purchased from you and placed in our works, we would say, generally speaking, we are very well pleased. The tools throughout are up to your usual standard and are efficient and accurate.

We are highly pleased with the large and small Boring and Turning Mills. The larger tool, with a Cylinder Boring Attachment, is well known to the mechanical public, but we fancy, from seldom seeing these tools as small as 60-inch swing, such as you sent us, that the advantages of such a tool are not properly appreciated. The rapidity with which all work can be chucked, centered, bored and turned up to 60 inches on this machine far surpasses similar operations in connection with lathe work, owing, mainly, to the adjustment of the two tools to a common center. Being in a horizontal direction, no counterweights are required.

The tool which specially meets our approval is the HORIZONTAL BORING, DRILLING AND MILLING MACHINE. The spindle carrying the drill, or drilling head, may be projected a distance of 48 inches from the face of the machine. It has a horizontal movement of 108 inches, and a vertical of 72 inches. These limits cover a wide range of work. For instance, in machining the bed plate of a blowing engine, we support the casting vertically in front of the machine, face the bearings for the housings and for the steam cylinder, mill the seats for the pillow blocks and pillow block caps, treating the various heights, or levels, and directions without change in the position of the bed plate. The latter is then lowered to a horizontal position and we proceed to bore out the main bearings. Likewise the blowing engine housings, after being bolted firmly together and to stools, are machined and drilled to gauge in a remarkably short time. In all the foregoing, parallelism of surface is insured. We bore out each air-valve seat in our blowing cylinder heads, reaching each and every one without change, the head being 9 feet 6 inches in diameter. Our patent tuyere stocks require spherical joints, which must be machined accurately. These joints we get with one cut, accomplishing the same quickly by means of a simple cutter-head attachment to the milling tool spindle.

Enough has been said to exemplify the wide range of the tool. It is the first eminently good step out of the old range of lathe, planer, etc., etc., that is applicable to general work.

Yours truly, GORDON, STROBLE & LAUREAU (Limited).
FRED. W. GORDO'

Smith Bridge Co.

Niles Tool Works, Hamilton, O. TOLEDO, O., June 7, 1889.

Gentlemen:—Yours of the 6th inst., asking our opinion of the Horizontal Boring Machine that you furnished us, is received. The machine has been in constant use for a number of years and we are very well pleased with its work. Respectfully yours,

THE SMITH BRIDGE CO.,
WM. S. DALY, Secretary.

The Pusey & Jones Co.

Niles Tool Works, Hamilton, O. WILMINGTON, DEL., Oct. 17, 1890.

Gentlemen:—It gives us pleasure to state that the Horizontal Boring and Drilling Machine purchased from you has given us entire satisfaction in every way. We find it an exceedingly useful tool, and we have had it in operation every working day since it arrived and was put in place. We remain. Yours truly, THE PUSEY & JONES CO.,
W. W. PUSEY, Treasurer.

Louisville Bridge and Iron Co.

Niles Tool Works, Hamilton, O. LOUISVILLE, KY., Aug. 29, 1890.

Gentlemen:—Replying to your inquiry of the 20th inst., in regard to Bridge Chord Boring Machine furnished us some time ago, would say that the tool has given perfect satisfaction, and that we do not now understand how we could have done without such a machine for so long a time.

Yours truly,
LOUISVILLE BRIDGE AND IRON CO.,
J. M. JOHNSON, Engineer.

The Herreshoff Manufacturing Co.

Niles Tool Works, Hamilton, O. BRISTOL, R. I., June 8, 1889.

Gentlemen:—Yours 6th inst. at hand. The No. 1 Boring Machine bought of your works some time since, is, in our opinion, an excellent tool for light boring and heavy drilling. It has been in constant use since being set up and has done very satisfactory work, and we should not care to be without it in our shop. Respectfully, HERRESHOFF M'F'G CO.

West Superior Iron and Steel Co.

Niles Tool Works, Hamilton, O. WEST SUPERIOR, WIS., Oct. 16, 1890.

Gentlemen:—We have had one of your Horizontal Boring and Drilling Machines, with four feeds and compound rest with swivel, in use for something over a year—much of the time night and day—and have found it a very substantial and satisfactory tool. One drawback to this class of tools in many shops is entirely removed by the application of the compound rest, which enables us to do a great variety of work commonly done on lathes, and thus keep the tool busy. The new 10-16-foot Boring Mill arrived yesterday.

Very truly yours,
WEST SUPERIOR IRON AND STEEL CO.,
W. F. MATTES, Gen. Mgr.

Boston Bridge Works.

Niles Tool Works, Hamilton, O. BOSTON, MASS., Oct. 16, 1890.

Gentlemen:—The Horizontal Boring and Drilling Machine you furnished us several years ago has been in constant use since. We have found it thoroughly satisfactory in all particulars.

Yours truly, BOSTON BRIDGE WORKS.

Van Winkle Gin and Machinery Co.

Niles Tool Works, Hamilton, O. ATLANTA, GA., Aug. 21, 1890.

Gentlemen:—The Turret Head Boring Machine you built for us some four years ago has been in constant use ever since on varied work. We consider this the most valuable tool in our works. It does its work accurately, is always ready and never gets out of order.

Yours truly,
VAN WINKLE GIN AND MACHINERY CO.,
E. VAN WINKLE, President.

Watervliet Arsenal.

Niles Tool Works, Hamilton, O. WEST TROY, N. Y., Jan. 21, 1891.

Gentlemen:—Your Mr. G. A. Lambert has completed the erection of the large Horizontal Boring, Drilling and Milling Machine, and also started this handsome tool, whose operations are performed with perfect nicety and ease. This machine is very highly commended, and there is also only one opinion expressed about the 8-foot Boring and Turning Machines, which form a handsome display in the gun factory of good design and splendid workmanship. They bore and turn with the great accuracy which modern gun work requires. I beg to compliment you also as to the appearance and perfect performance of all other machines you furnished for the gun factory, including five heavy lathes for turning gun-forgings, small lathes, slotter, etc., and remain,

Yours very truly, ANTHONY VICTORIN,
Constructing Engineer.

REFERENCES.

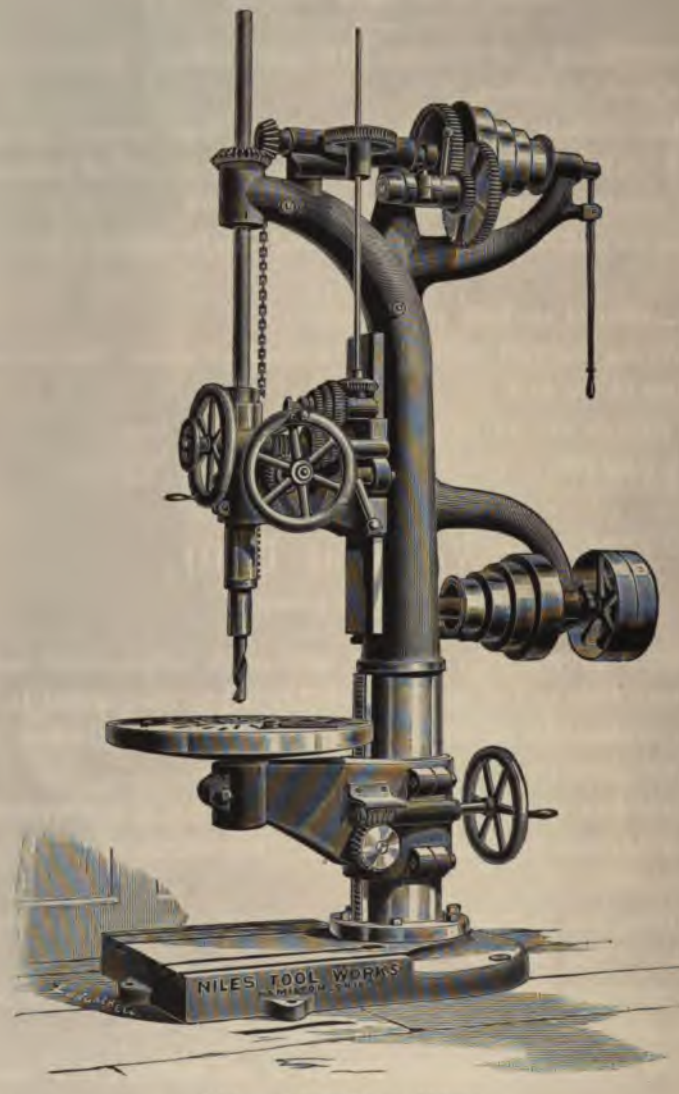
American Ship Windlass Co., Providence, R. I.
Herreshoff Manufacturing Co., Bristol, R. I.
Union Pacific R. R.
The Pusey & Jones Co., Wilmington, Del.
Northern Pacific R. R.
The Smith Bridge Co., Toledo, O.
Boston Bridge Co., Boston, Mass.
E. Van Winkle Gin & Mach. Co., Atlanta, Ga.
Cincinnati, New Orleans & Texas Pacific R. R.
Bucyrus Foundry and M'f'g Co., Bucyrus, O.
West Superior Iron & Steel Co., W. Sup., Wis.
Wm. Cramp & Sons' Ship & Engine Bldg. Co., Philadelphia, Pa.
Millburn Gin and Machine Co., Memphis, Tenn.
Lake Erie Engineering Works, Buffalo, N. Y.
New York, Chicago and St. Louis R. R.
Carnegie, Phipps & Co., Pittsburg, Pa.
Walker Manufacturing Co., Cleveland, O.
Hackney Hammer Co., Cleveland, O.
Milwaukee, St. Paul and Sault Ste. Marie R. R.
Valley Engine and Mach. W'ks, Lynchb'g, Va.
Marschutz & Cantrell, San Francisco, Cal.
Hall Steam Pump Co., Pittsburg, Pa.
Chicago, Burlington & Quincy R. R.
Gordon, Strobel & Laureau, Philadelphia, Pa.
Morgan Engineering Co., Alliance, O.
Pennsylvania R. R. Co.
Riter & Conley, Pittsburg, Pa.
Carlisle M'f'g Co., Carlisle, Pa.
Mosler Bank Safe Co., Cincinnati, O.
Hackney Hammer Co., Cleveland, O.
Jas. P. Witherow, New Castle, Pa.
Walter Scott & Co., Plainfield, N. J.
Northern Pacific Terminal Co.
Helmbacher Forge & Rolling Mills Co., St. Louis, Mo.
DeLavergne Refrigerating Machine Co., New York, N. Y.
A. L. Ide & Son, Springfield, Ill.
Knowles Steam Pump W'ks, Warren, Mass.
Kentucky Central R. R.
Chesapeake and Ohio R. R.
E. D. Jones, Sons & Co., Pittsfield, Mass.
Stedman & Co., Aurora, Ind.

PART VIII.

DRILLING MACHINES.

NILES TOOL WORKS,

HAMILTON, OHIO.



NO. 3 VERTICAL DRILL.

PART VIII.

No. 2 Vertical Drill.

DRILLS TO CENTER OF 24 INCHES.

THE spindle has a traverse of 8 inches, with quick return. Distance from end of spindle to base, 54 inches.

Cone has four speeds for 2-inch belt, and is back geared, giving eight changes of speed. The spindle is driven by accurately cut bevel gearing.

The base is provided with T slots for securing work.

The table has a vertical lift of 20 inches, and can be swung entirely around the column.

The spindle and head are both nicely balanced.

The arm carrying the belt shifter can be revolved around the driving shaft to suit the direction of the belt.

The driving pulleys are 12 inches diameter, 3 inches face.

Speed, 240 revolutions.

No. 3 Vertical Drill.

DRILLS TO CENTER OF 30 INCHES.

THE spindle has a traverse of 12 inches, with quick return, hand and power feed. Distance from end of spindle (at full hoist) to base, 4 feet 10 inches.

This tool is calculated for all drilling from a ⅜-inch hole to 3 inches, and will bore up to 10 inches diameter.

The cones have four speeds for a belt 2 inches wide. It is powerfully back geared, giving a wide range in speeds and power. The spindle is driven by bevel gearing accurately cut.

The arm carrying the belt shifter can be revolved around the driving shaft to suit the direction of the belt.

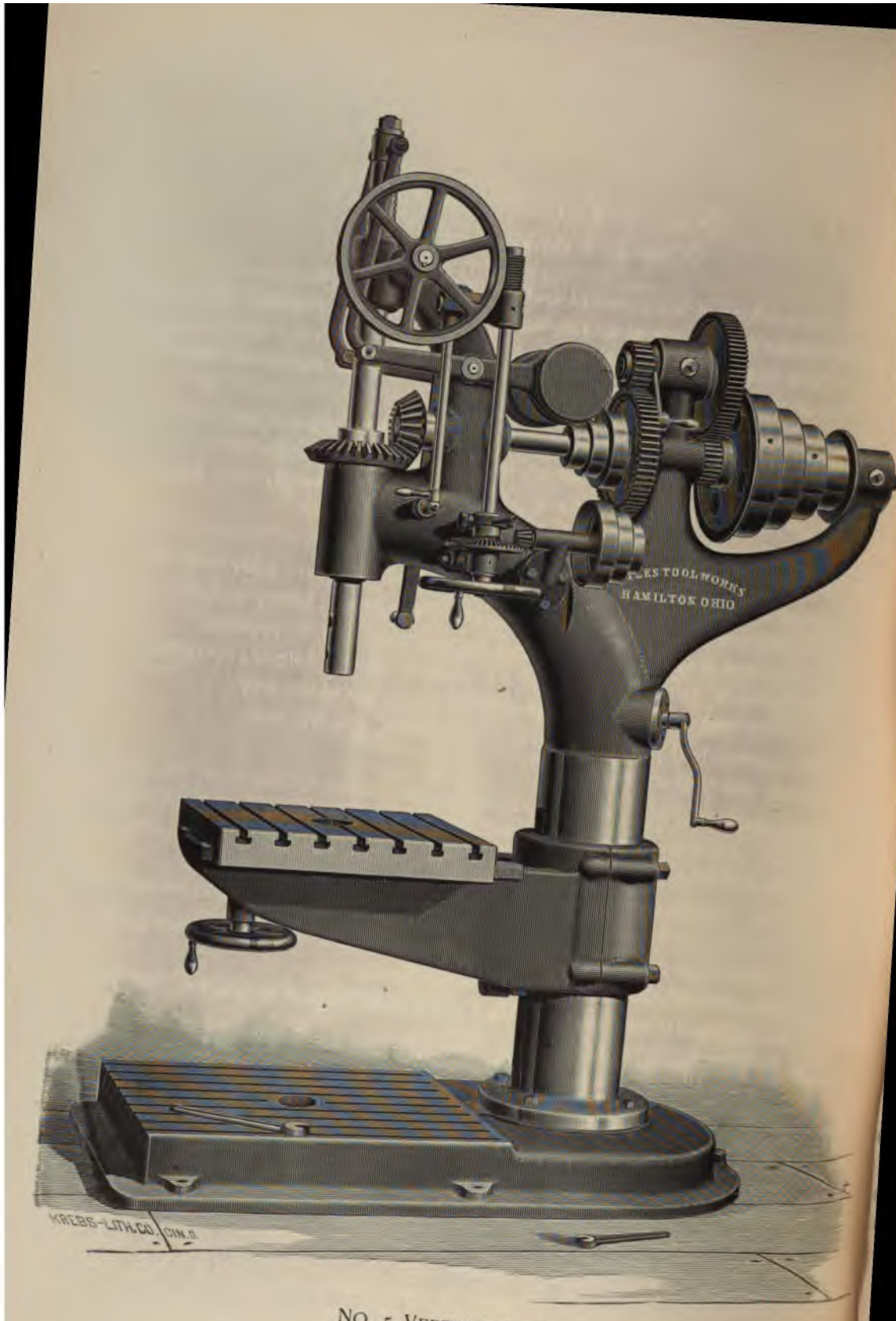
The table is 30 inches diameter. It is raised and lowered by screw operated by bevel gearing, and has a lift of 15 inches.

The drill head has a vertical adjustment of 24 inches. It is raised and lowered by screw.

This machine is built from entirely new patterns, is very heavy and powerful, provided with every convenience, and fitted up in the best manner.

The driving pulleys are 14 inches diameter, 2¾ inches face.

Speed, 190 revolutions per minute.



No. 5 Vertical Drill.

No. 5 Vertical Drill.

DRILLS TO CENTER OF 50 INCHES.

THIS is a machine of great weight and power, built from entirely new patterns and calculated to withstand the heavy duty of modern practice. Especial re has been taken to arrange all the adjustments for quick and easy manipulation.

This machine is adapted for drilling holes from ½-inch to 4 inches, and will re up to 12 inches.

The spindle has 15 inches traverse, is counterweighted and has quick return, nd and power feeds. Distance from end of spindle to base, 56 inches.

The cone has four speeds for a 3-inch belt, and is strongly back geared, ving eight changes of speed.

The feed is very powerful; three changes are provided.

The machine is furnished with a strongly gibbed square table with hori- ntal adjustment by screw and bevel gearing. The utmost nicety of setting can us be obtained, and the movement may be used as a feed for profiling.

The table is raised and lowered by a screw in the column, operated by vel gearing, and may be swung around the column out of the way.

The countershaft pulleys are 18 inches diameter, 4 inches face.

Speed, 170 revolutions.

No. 6 Vertical Drill.

DRILLS TO CENTER OF 60 INCHES.

THE spindle has 18 inches traverse, with quick return, hand and power feeds.

Distance from end of spindle to base, 58 inches.

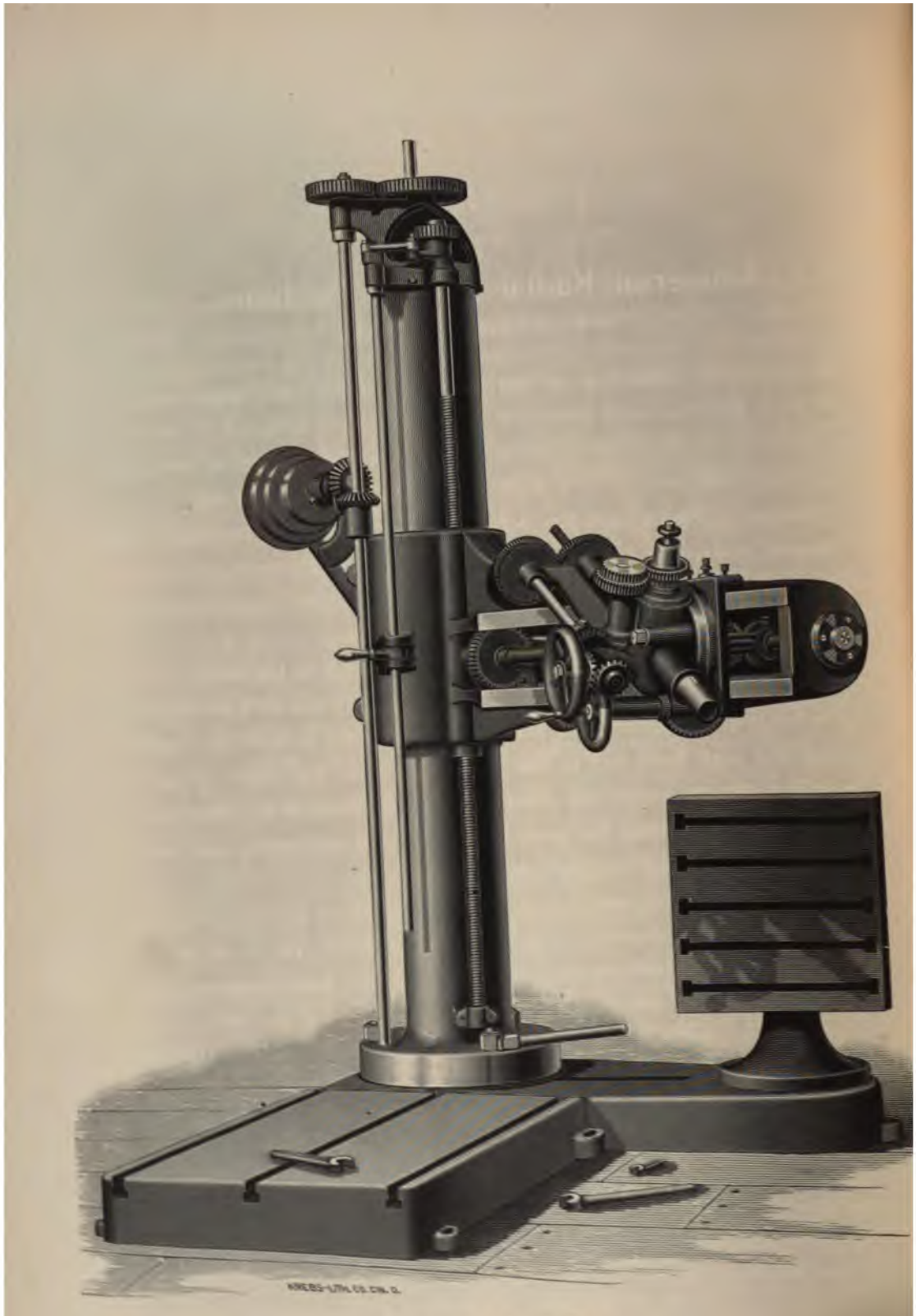
This machine is adapted for drilling holes from ½-inch to 4 inches, and will re to 12 inches.

Cone has five speeds for 3-inch belt, and is back geared, giving ten changes f speed.

Machine has a square table adjustable on its supporting bracket by means of screw and bevel gearing. It is raised and lowered by a screw in the column, erated by bevel gearing, and may be swung around the column out of the way.

Countershaft pulleys are 18 inches diameter, 4 inches face.

Speed, 180 revolutions.



UNIVERSAL RADIAL DRILL.

Universal Radial Drilling Machines.

NEW AND IMPROVED PATTERNS.

THE cut on the opposite page represents one of our latest improved Radial Drills. They are built from new patterns and are designed to meet the requirements of modern shop practice. The bearing of the arm on the column is made very long, and the arm itself is made of a very rigid form.

This type of Radial Drill has been manufactured by this company for the past twenty years, and has been found to be extremely serviceable for all classes of work. From time to time improvements have been made, always keeping this machine up to the demands of the times.

In this machine it is much easier to move the drill to the work than the work to the drill. One man can accomplish it quickly and without any effort. Under ordinary circumstances it is extremely troublesome to meet the conditions of getting the work level, and at the same time have the center of the hole to be drilled directly under the point of a rigidly fixed drill. More time is generally wasted in getting the work in position, and readjusting and leveling it, than is required for drilling the holes.

The operation of this machine can be explained as follows: Place any heavy piece of work within the circle of 9 feet diameter; put it on the floor, on the base, or on the table, as may be most desirable; level it without regard to the drill; lower the drill to it, raise the drill to it, swing the drill to it, use at an angle if necessary, and the work need not be disturbed till the drilling is done.

This machine serves the purpose of more than one drill press. It has such a range that one piece of work can be temporarily abandoned and another piece undertaken, which recommends its use in smaller shops.

General Description.

A HEAVY, rotating column is mounted upon a long supporting sleeve, which is rigidly secured to a heavy base plate, and is accurately fitted to a bearing in the column.

The column is turned all over, and upon it the radial arm is mounted. This has also a very long, accurately fitted bearing, and can be clamped in any position. The column can also be clamped rigidly to the base plate, thus making the whole machine very stiff.

The machine is driven from an overhead countershaft operated by bevel gearing, and an upright shaft to drive the central spur gear seen at the top of the column. This drives the upper cone by means of the external upright shaft and bevel gears, and also communicates motion through tumbler gearing to the screw, which is operated to raise and lower the arm by power.

The upright central driving shaft is splined through the gear, thus allowing the countershaft to be located at any height from 9 to 16 feet above the floor.

Motion is communicated to the drill spindle from the cone, which is strongly back geared, by means of spur gears, a splined shaft and bevel gearing.

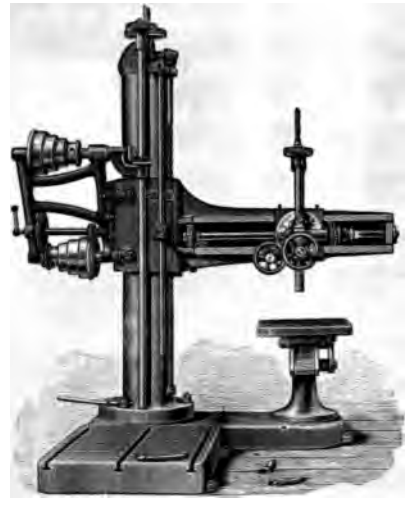
The arm is of the best form possible to resist the strains to which it is subjected. It is made in form similar to a box girder. It is made in one piece, the sleeve surrounding the column forming a part of the same, and heavy web on the upper side resists the upward strain.

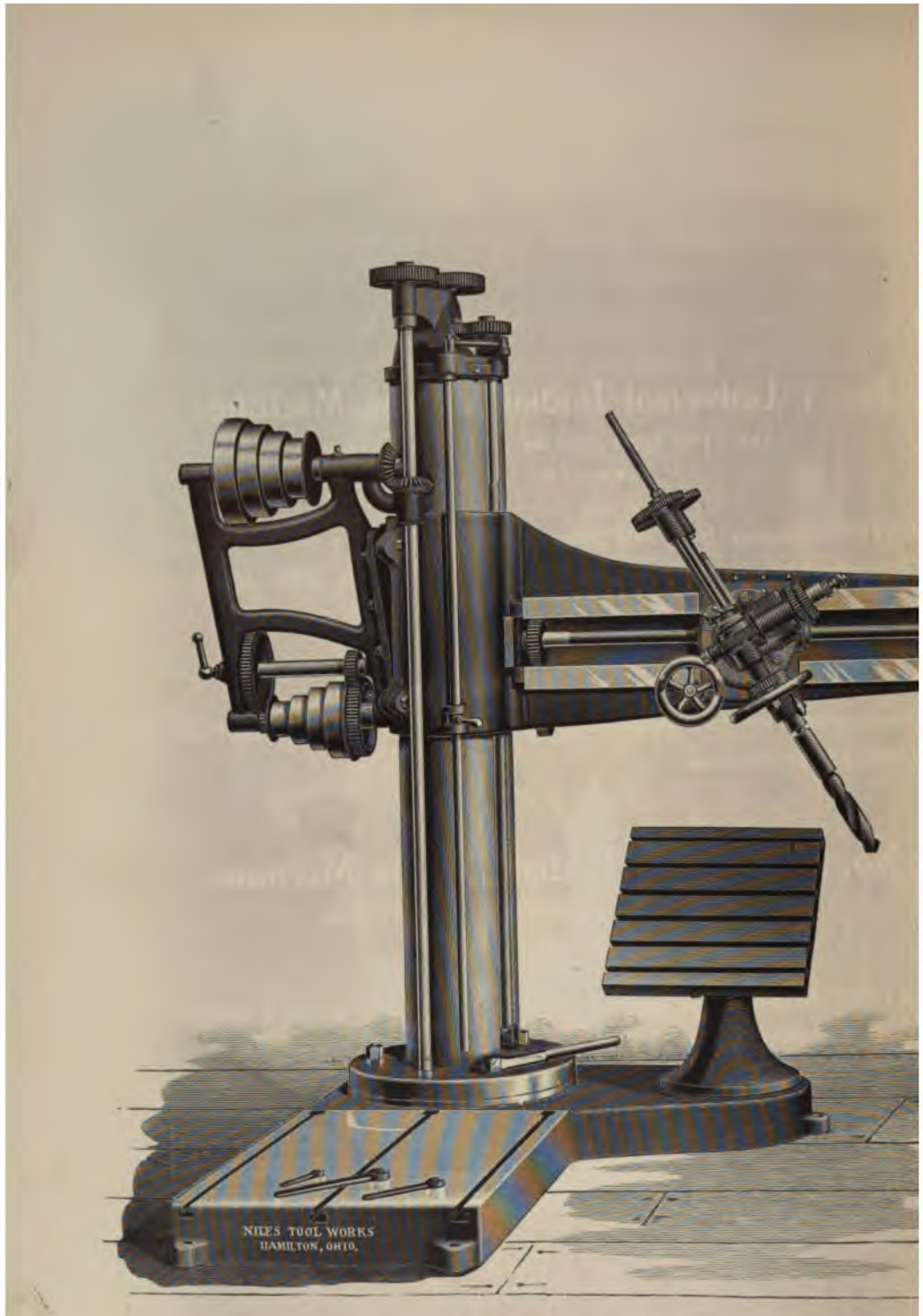
The drill head is securely gibbed upon the arm, and is adjusted to any position on the arm by means of a hand wheel and rack and pinion. It is also adjustable to any angular position upon its saddle, to which it is securely clamped. It is nicely balanced, so that clamp bolts may be loosened for angular setting without danger of breaking drills or injury to the operator.

The column of the machine is set upon rollers bearing entirely upon the periphery. This arrangement enables the operator to handle the machine

with the greatest ease. The combined movements of the arm and head enable the drill to be rapidly brought to any desired position.

When the machines are required to drill a number of parallel holes on the end of work, we recommend, wherever practicable, that a pit be made on one side of the base and lined with T-slotted plates for holding work. This obviates the need of extra high columns and keeps the arm within easy reach of the operator, and in the best position to resist strains.





NO. 2 UNIVERSAL RADIAL DRILL.

No. 1 Universal Radial Drilling Machine.

ARM, 5 FEET LONG. COLUMN, 7 FEET 4 INCHES HIGH.

(Patented May 10, 1887.)

GREATEST distance from sole plate to end of spindle, 5 feet 3 inches.

Greatest distance from center of column to spindle, with drill head at extreme end of arm, 4 feet 6 inches.

Back geared, power feed, balanced head, quick return.

Weight, 6,200 pounds.

Countershaft has two pulleys 16 inches diameter, 3½ inches face, and should run 125 revolutions.

No. 2 Universal Radial Drilling Machine.

ARM, 6 FEET LONG. COLUMN, 8 FEET 3 INCHES HIGH.

(Patented May 10, 1887.)

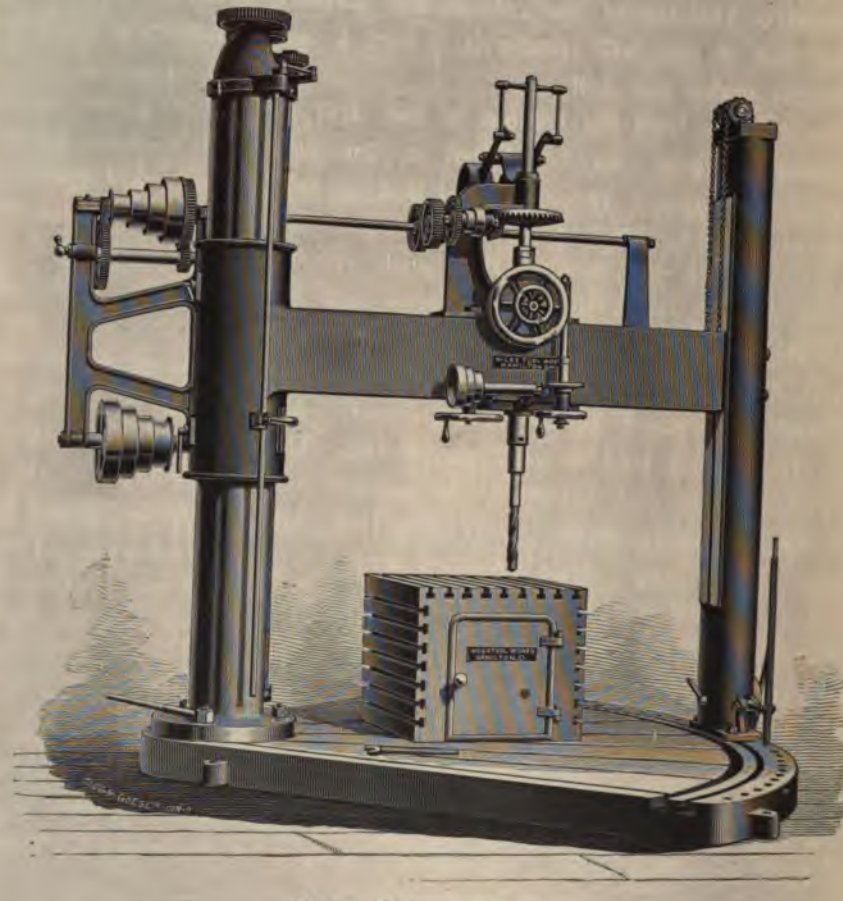
GREATEST distance from sole plate to end of spindle, 5 feet 7 inches.

Greatest distance from center of column to spindle, with drill head at extreme end of arm, 5 feet 7 inches.

Back geared, power feed, balanced head, quick return.

Weight, 10,000 pounds.

Countershaft has two pulleys 16 inches diameter, 4 inches face, and should run 125 revolutions.



No. 3 Radial Drill.

No. 3 Radial Drilling Machine.

ARM, 7 FEET LONG. COLUMN, 9 FEET HIGH.

(Patented December 14, 1869.)

THE column is 9 feet high, turned true and parallel. When the arm is raised to the top of the column the distance between the base plate and the end of the drill spindle is 6 feet 5 inches, admitting work nearly that height under the drill.

The distance from the column to the drill spindle is 5 feet 9 inches, consequently a hole can be drilled in the center of a circle 11 feet 6 inches in diameter, a reach beyond that of any ordinary drill press. The spindle is made of steel, and is $2\frac{15}{16}$ inches diameter. It has the necessary traverse for deep holes. Has quick return.

The driving cones have four steps, and are powerfully back geared, giving eight changes of speed. These cones are quite accessible, and any desired change of speed can readily be made. The driving power is very great and fully equal to any requirement. All gearing is cut from the solid. The power feed is very convenient. The base is a substantial cast iron plate turned and T-slotted. It extends over one-fourth of the circle made by the swing of the arm. The box table may be moved to any position on the base. It is provided with a cupboard for tools. The outer end of the radial arm is supported by a column, and is counterweighted.

Countershaft has two pulleys 16 inches diameter, 4 inches face, and should run 120 revolutions.

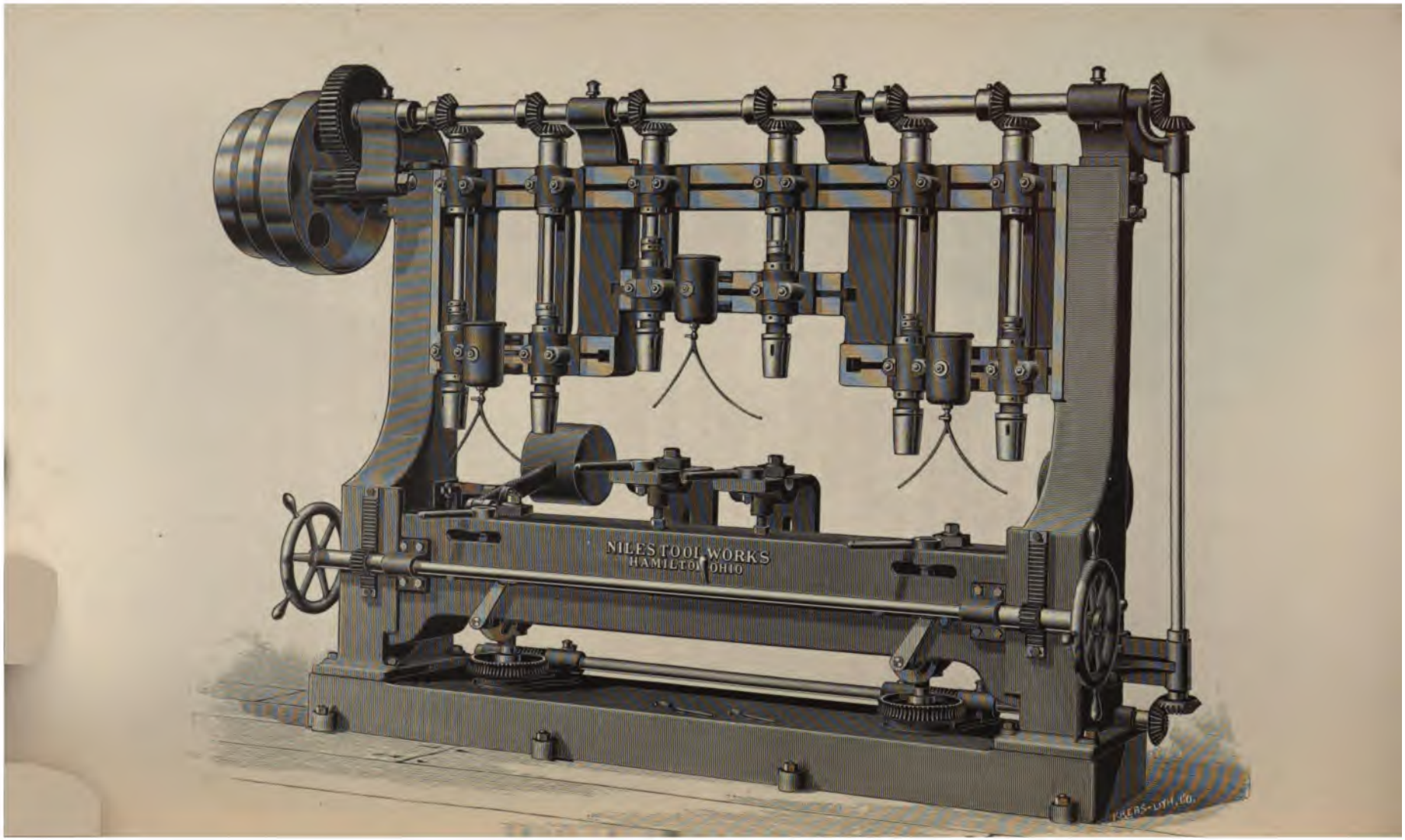
This machine is designed for heavy work. Holes of large diameter may be bored, and cylinder heads and flanges as large as 24 inches diameter may be faced off.

A large steam pump works are using one of these machines for boring out seats for pump valves, facing the flanges of the pump cylinders and other heavy work of a similar nature.

The arm is in the shape of a double web, the saddle sliding on the top and the spindle operating between the sides. It has a very long bearing on the column, and, being supported at the outer end, is very rigid.

The spindle has vertical traverse only. It can not be set over to operate at an angle, as on the smaller sizes.

For a great variety of work this machine has no equal. A great saving in cost may be effected by its use.


NILES TOOL WORKS
HAMILTON OHIO

Arch Bar Drilling Machine.

SIX OR EIGHT SPINDLES.

DESIGNED for drilling car truck frames.

Driven by cone with three steps for a belt 4 inches wide, and very strongly geared. The spindles are all operated by one heavy shaft, and drill the six or eight holes at one operation.

Each spindle has a socket adjustable vertically, allowing the drills to be used at different levels. The spindles have a lateral adjustment for change of centers. The center spindles have an adjustment from 6¾ to 22 inches between centers, and the outside spindles an adjustment from 7½ to 18 inches between centers.

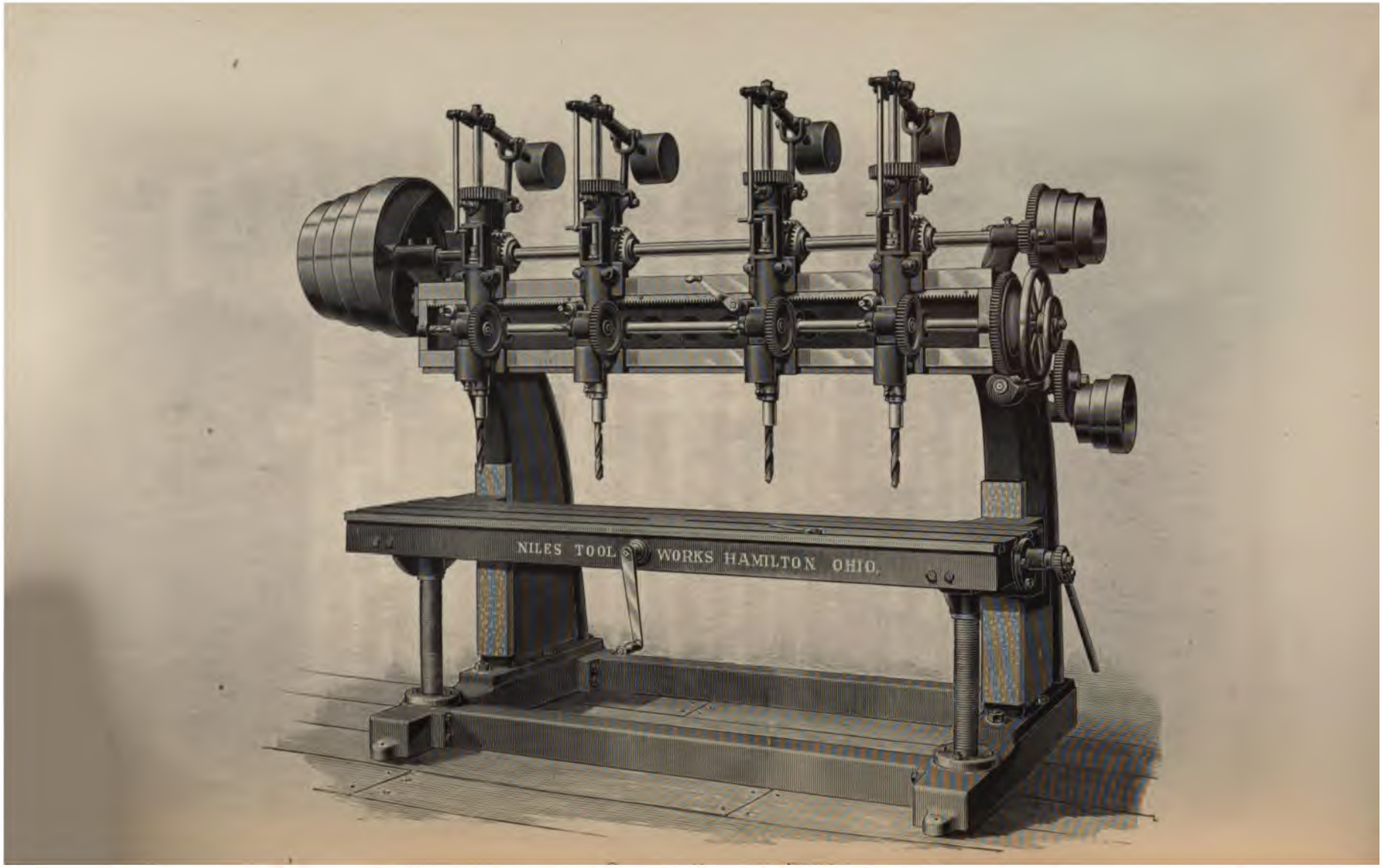
The table has automatic feed. The feed is operated by worm gearing and screws at either end of the table, hence the work is brought squarely up to the drills.

The table may also be raised or lowered by hand. It is counterweighted, relieving the feed from the dead weight of the table and work.

The table is furnished with supports for the arch bar, and the necessary clamping devices.

This machine is unquestionably the strongest and most powerful built for this work. The service required is very heavy, and usually the machine is crowded to its utmost capacity.

The countershaft has two pulleys 24 inches diameter, 4¾ inches face. Speed of countershaft, 210 revolutions per minute.


NILES TOOL WORKS HAMILTON OHIO.

Multiple Drilling Machine.

FOUR OR MORE SPINDLES.

FOR drilling ship plates, boiler plates, etc.

Has four spindles, with ample power to drill four 1¼-inch holes at the same time.

Spindles have a traverse of 12 inches, and each is counterweighted and has quick return. Each drill head has an independent adjustment on the cross rail. The spindles may be adjusted to within a distance of 7½ inches between centers. The drill spindles have power feed with three changes. They may be fed also by hand simultaneously.

Each spindle has an independent feed clutch, so that any one of the drills may be thrown out of feed while the others are feeding; also giving an independent hand motion and quick return to each spindle.

Driving cone has four steps for a belt 4 inches wide.

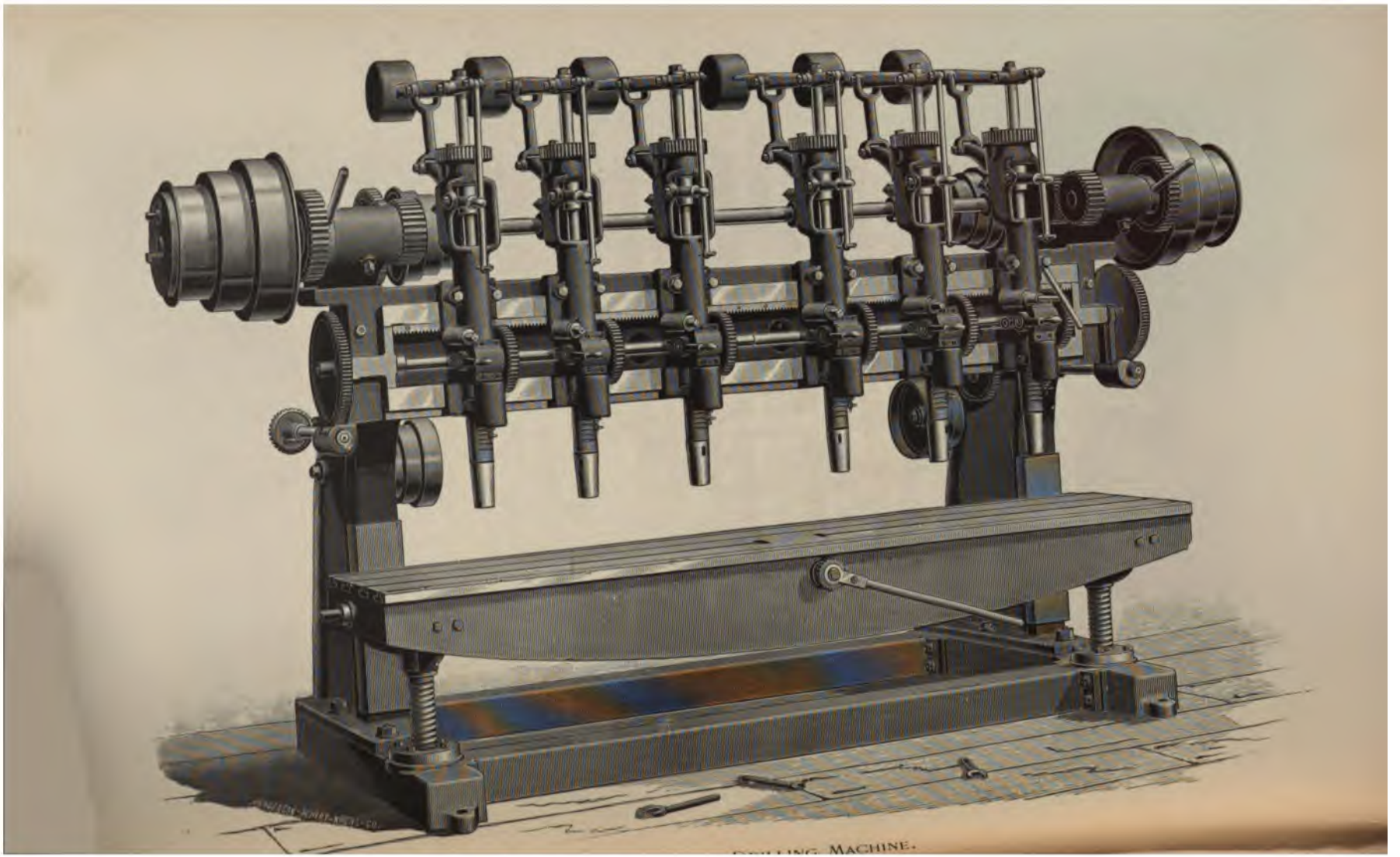
The cross rail is 8 feet long, secured to two substantial uprights.

A large, flat, T-slotted table is provided. It is raised and lowered by two heavy screws, and has a vertical adjustment of 24 inches.

The number of spindles and length of cross rail may be varied to some extent, when required.

Countershaft pulleys 24 inches diameter, 5½ inches face.

Speed, 150 revolutions per minute.



DRILLING MACHINE.

Double Multiple Drilling Machine.

FOUR OR MORE SPINDLES.

THE illustration on opposite page represents this machine with six spindles, three of them being driven independently from each end. This arrangement is of great convenience and advantage when holes of different size and depth are to be drilled at the same time in the same, or different, pieces. Both ends are back geared. Each end has independent feed.

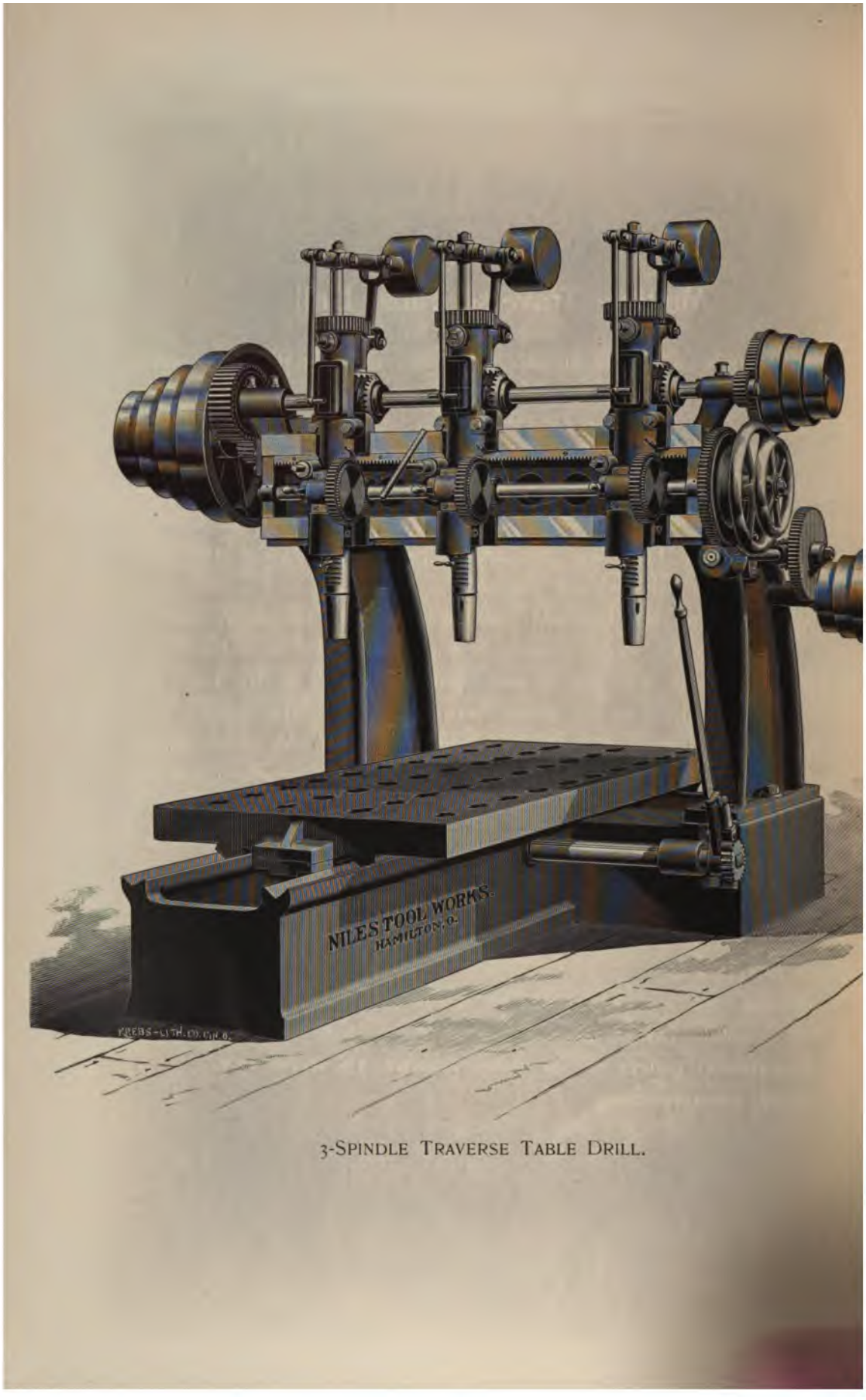
The spindles have a traverse of 12 inches, and each is counterweighted and has quick return. Each drill head has an independent adjustment on the cross rail. The spindles may be adjusted to within a distance of 7½ inches between centers. The drill spindles have power feed with three changes. They may be fed also by hand, simultaneously. Each spindle has an independent feed clutch, so that any one of the drills may be thrown out of feed while the others are feeding, also giving an independent hand motion and quick return to each spindle.

Driving cones have three speeds for a 4-inch belt.

The greatest distance between the two outside spindles is 90 inches.

A large, flat, T-slotted table is provided. It is raised and lowered by two heavy screws, operated by bevel gearing from either the end or side, and has a vertical adjustment of 24 inches.

Countershaft pulleys are 24 inches diameter, 5½ inches face, and should run 150 revolutions per minute.



3-Spindle Traverse Table Drill.

Multiple Traverse Table Drill.

THIS machine is similar in design to our regular pattern of multiple drill, except that it is provided with a table arranged to slide upon the bed.

Machines of this class are especially desirable when it is required to drill a number of holes in heavy pieces clamped together, such as vault doors, etc. In work of this kind the separate pieces can be fastened together upon the table and any desired part brought under the drills quickly and accurately, without risk of disarranging any of the work done. By using stops on the bed and rail, duplicates may be easily made, or holes made to match nicely when it is impossible to drill them together.

It can be built with one or more spindles mounted on the rail. The drills can be adjusted to 7½ inches between centers. The spindles have 12 inches travel, and each has independent power feed with three changes. They are also arranged for hand feed, and each is counterweighted and has quick return.

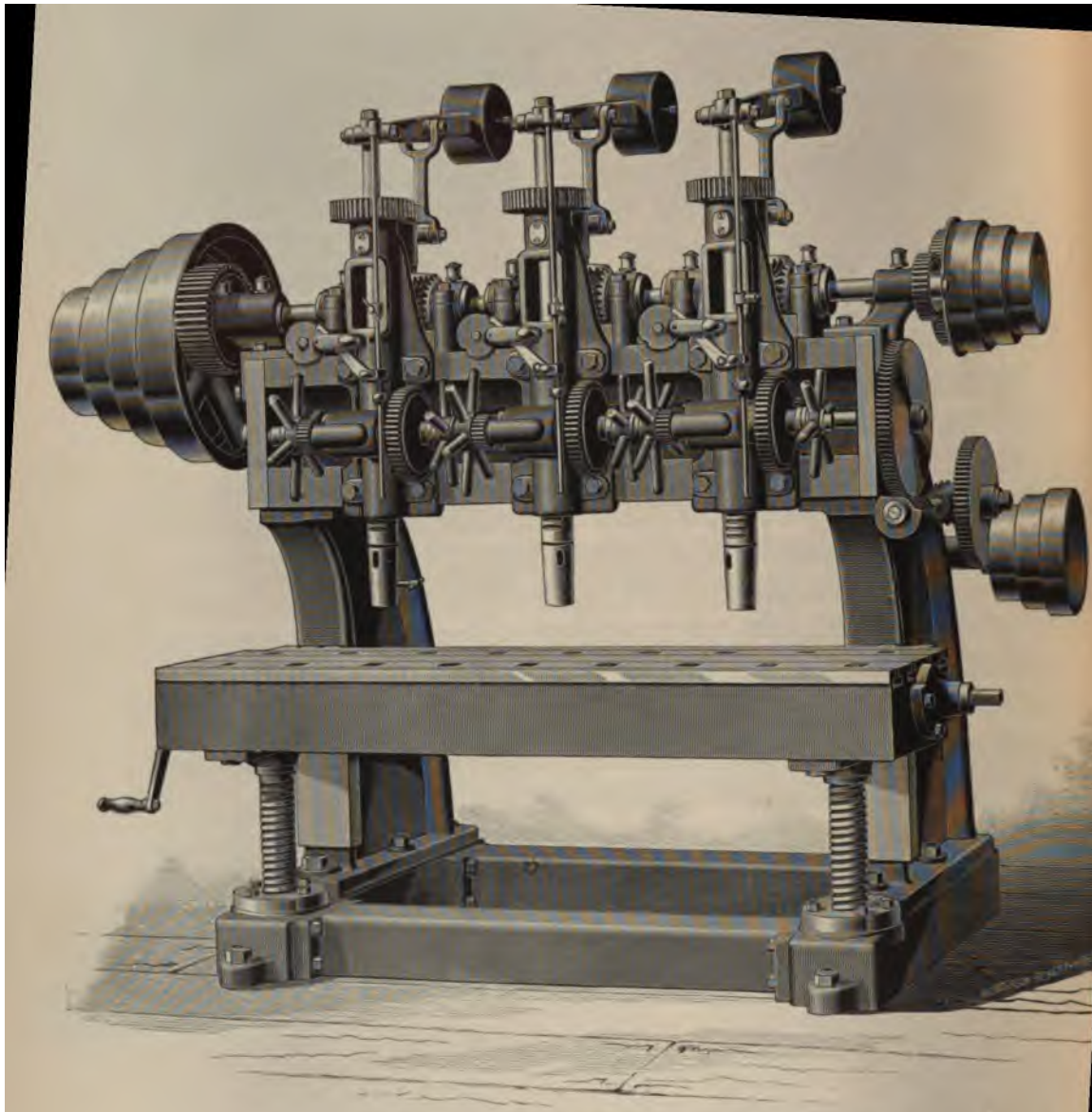
The machine is capable of drilling three 1½-inch holes or two 2-inch holes at the same time through steel plate.

Clearance between housings, 48½ inches. The work is mounted on a table 7 feet long, 36 inches wide. It is movable by rack and pinion on a bed 10 feet long.

Driving cone has four speeds for 4-inch belt, and is strongly geared to drill spindles. Driving gears and spindles are steel.

Countershaft pulleys are 20 inches diameter, 5½ inches face.

Speed, 220 revolutions.



MULTIPLE DRILLING AND TAPPING MACHINE.

Multiple Drilling and Tapping Machine.

THE illustration on opposite page represents one of our multiple drills arranged with reversing gear for automatic drilling and tapping.

We especially recommend this machine for drilling and tapping valves, fittings and work of like character.

It is powerfully geared and has ample power to carry three 1¼-inch pipe taps at the same time.

The spindles have a traverse of 12 inches, and each is counterweighted and has quick return. Each spindle is independent, and has an automatic stop for throwing the spindle out of gear when drilling or tapping to depth.

The table is securely gibbed to the housings. It is supported on two large screws, which are operated from either end by bevel gearing.

The greatest distance from end of spindle to the table is 24 inches. Distance from face of housings to center of spindle is 10 inches.

A powerful feed, with three changes, is provided.

Countershaft and necessary wrenches furnished.

4-Spindle Wheel Drill.

FOR DRILLING STEEL-TIRED CAR WHEELS.

THIS machine is of same style as the Multiple Drills described.

Has four spindles, two for drilling holes in hub, two for drilling holes in rim. Outside drills have independent feed. Center drills have one feed for both. Range of center drills from 10½ to 15½ inches between centers. Range of outside drills from 10½ to 35½ inches between centers.

Drill spindles are counterweighted and have a travel of 7½ inches, with two changes of feed.

Car wheel is held in a self-centering chuck, forming part of a revolving table, with holes on its periphery to set wheels for any desired number of divisions.

Chuck table moves out on ways from under the drills so that wheels can be readily put in or taken out of the chuck.

Countershaft has tight pulley 20 inches diameter, 8½ inches face, for 6-inch double belt. Speed, 70 revolutions.

PHOTOGRAPH FURNISHED ON APPLICATION.

Multiple Spindle Wheel Drill.

FOR DRILLING STEEL-TIRED CAR WHEELS.

(Patented July 28, 1885.)

THE drill has twenty-seven spindles, divided into two groups.

The center group, consisting of nine drills, is contained in one head, and is used for drilling the holes for hub bolts

The outer group, consisting of eighteen drills, is used for drilling the holes for tire bolts, and is so arranged that all of the drill heads, or a part of them, can be moved in or out radially, to suit different diameters.

The drill spindles run in brass bushes, adjustable for height, by which means the height of any drill point can be regulated to suit.

The two groups of drills are separately driven by a set of gearing, giving velocity to the drills proportioned to the hardness of material encountered.

The work is placed on a compound table having a self-centering chuck with circular motion for any desired adjustment of wheel under drills.

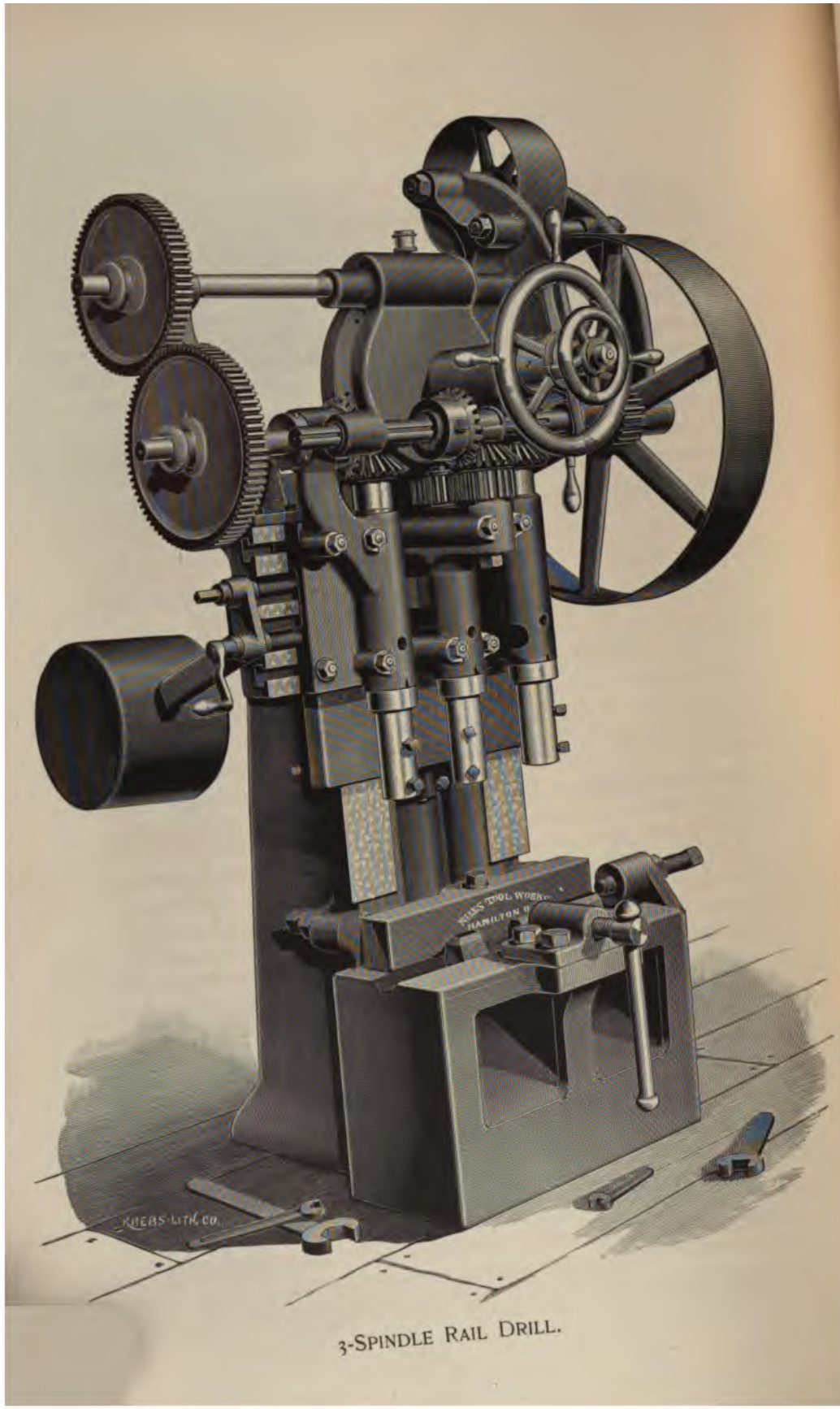
To facilitate handling the wheel, the chuck table moves on ways, enabling the wheel to be brought out from under the drills and lifted by an overhead crane or pulley block.

The feed is accomplished by two heavy steel screws under the work table, moving the same up to the drills. The feed pulleys are tight and loose, and feed belts are provided with convenient shifters, whereby the feed can be instantly stopped.

The work table is nicely balanced by counterweight under the sole plate, allowing rapid vertical adjustment of table by hand.

This machine may be furnished with a fewer or greater number of spindles, as may be required, or a different arrangement of the spindles to suit the number and arrangement of bolts in the wheel.

PHOTOGRAPH FURNISHED ON APPLICATION.



3-SPINDLE RAIL DRILL.

Rail Drilling Machine.

TWO SPINDLES.

FOR drilling steel rails for the fish-plate bolts.

This is a special machine, designed for this particular service in order to accomplish it in the most efficient and economical manner. The machines are generally used in pairs, one machine at each end of the rail.

The drills are adjustable horizontally, to drill from 3½ to 8 inches from center to center of drills. Powerful down feed of both drills simultaneously, and a quick return by hand movement.

The spindles and gearing are of steel.

The countershaft has two pulleys 20 inches diameter, 4¼ inches face.

Speed of countershaft, 110 revolutions per minute.

Rail Drilling Machine.

THREE SPINDLES.

FOR drilling steel rails for the fish-plate bolts.

The capacity of this machine is three holes, 1¼ inches diameter, in steel rails.

The range of drills is from 4 to 9 inches between centers. By means of adjusting screws the drill head can be rapidly set to any required position. The drills are set in heavy sockets, and held by two strong set screws. This enables all of the drill points to be set on a level.

The feed on the three drills is simultaneous by acting on the saddle carrying the three drill heads. Saddle is counterbalanced and has quick return. The range of feed allows the use of drills from 10 inches in length under socket to about 4 inches. Feed is transmitted to saddle by means of slip-gear on side of machine opposite to driving pulley. Two changes of feed can be obtained by simply transposing the slip-gears, thus giving a heavier feed when soft material is worked, and a lighter feed for hard material.

The driving pulley is attached to saddle, and idlers are provided to maintain the tension of belt in all its positions. The rail is supported on steel blocks and clamped against the clamping block on its back. The end adjustment of rail is obtained by a heavy set-screw in the cast steel bracket on the side of bed. The cuttings drop through the opening in the bed to the floor in front, and can readily be removed.

Our patterns are arranged so that the machine can be made either right or left, as may be desired. All of the driving gear is made of steel to avoid breakage. We consider this machine the heaviest and strongest of its class in the market.

Countershaft pulleys 24 inches diameter, 6 inches face.

Speed, 90 revolutions.

TESTIMONIALS AND REFERENCES.

TESTIMONIALS.

The Columbian Iron Works & Dry Dock Co.

Niles Tool Works, Hamilton, O. BALTIMORE, MD., Jan. 20, 1891.

Gentlemen:—In reply to your inquiry of the 16th inst., regarding the Radial Drill Press, 54-inch Lathe and Large Slotting Machine recently purchased from you, we take pleasure in saying that in their operation they have given us entire satisfaction.

Yours truly,

THE COLUMBIAN IRON WORKS & DRY DOCK CO.

WM. T. MALSTER, President.

The Westinghouse Air Brake Co.

Niles Tool Works, Hamilton, O. PITTSBURG, PA., Jan. 26, 1891.

Gentlemen:—Replying to your letter of January 23, 1891, would state that we have had in use for some time a 3-Spindle Drilling and Tapping Machine, also, a 22-Spindle Drilling and Tapping Machine, furnished by your company. These machines have proven quite satisfactory to us and have enabled us to REDUCE THE COST OF OUR WORK considerably.

Yours truly, T. W. WELSH,

Superintendent.

The Long & Allstatter Co.

Niles Tool Works, Hamilton, O. HAMILTON, O., Jan. 23, 1891.

Gentlemen:—Repyling to your favor of the 22nd, the No. 2 Radial Drill purchased from you in 1887 (the third one of your make we have placed in our works), is A 1 in every respect, giving us perfect satisfaction. We have used it constantly since setting it up and have had occasion to drill holes in our heavy castings at every conceivable angle. The machine has done its work perfectly and is in every way reliable. Our work is particularly adapted to the use of a radial drial, and the test we have given it is a severe one. We will be pleased to have you refer any purchaser to us, or show any one the machine in operation.

Yours truly,

THE LONG & ALLSTATTER CO.

Lidgerwood Manufacturing Co.

Niles Tool Works, Hamilton, O. NEW YORK, Feb. 14, 1889.

Gentlemen:—In reply to yours of February 7th, as regards the Radial Drilling Machine we have of yours in use, we beg to say that we now have SEVEN of them in use in our works, bought of you at various times since 1879. We also have several other makes of drills in use, but we cheerfully say that we like your machines better than any others we have used or seen. They are adapted to a wider range of work, are more easily changed from job to job, more convenient to operate, handle, etc.; hence more work can be done in a given time. The four machines bought of you in 1887, which are of your new pattern, cannot be made better. They look and work admirably. We shall advocate them wherever we can, as we know they are good. They are a first-class boiler shop drill, also for general drilling, tube heads, etc., they can't be beat.

Yours truly,

LIDGERWOOD MANUFACTURING CO.

The Solvay Process Co.

Niles Tool Works, Hamilton, O. SYRACUSE, N. Y., Jan. 24, 1891.

Gentlemen:—Your Radial Drill has been in use for past six months. We have found it very satisfactory in all respects. Yours truly,

THE SOLVAY PROCESS CO.,
W. B. COGSWELL, Gen'l Manager.

Otis Brothers & Co.

Niles Tool Works, Hamilton, O. NEW YORK, Oct. 17, 1890.

Gentlemen:—We beg to say that the Radial Drills which you furnished us three years ago, have been in constant operation since that time and have given us the best of satisfaction. And in case we have further orders to place for drills, we shall certainly give you a decided preference.

Yours truly, OTIS BROTHERS & CO.

Brush Electric Co.

Niles Tool Works, Hamilton, O. CLEVELAND, O., Nov. 1, 1890.

Gentlemen:—Yours of the 14th inst. received. We have used your Radial Drill in our works for a long time; it has given the best of satisfaction—no repairs needed. It is all you claimed for it. Yours truly, BRUSH ELECTRIC CO.

Illinois Steel Co.

Niles Tool Works, Hamilton, O. JOLIET, ILL., Jan. 22, 1891.

Gentlemen:—Replying to your inquiry of January 16th, I have to say, we have a 30-inch Lathe and EIGHT 3-SPINDLE RAIL DRILLS of your make that give us entire satisfaction, the Rail Drills especially doing excellent work.

Yours truly, CHAS. PETTIGREW.
Superintendent.

The P. H. & F. M. Roots Co.

Niles Tool Works, Hamilton, O. CONNERSVILLE, IND., Jan. 23, 1891.

Gentlemen:—For the last two years we have had one of your largest size Radial Drills in use in our works, and it has given the best of satisfaction in every way. It has not cost a cent for repairs. The WORKMANSHIP IS VERY SUPERIOR. We know of no better Radial Drill.

Yours truly,

THE P. H. & F. M. ROOTS CO.,
E. D. JOHNSTON, Vice-Pres't & Gen'l Manager.

The Mosler Bank Safe Co.

Niles Tool Works, Hamilton, O. CINCINNATI, O., Oct. 16, 1890.

Gentlemen:—Your inquiry of the 14th inst. as to how we like the [illegible] Drill furnished us by you received. In reply would say that we [illegible] in our shop. It TURNS OUT ACCURATE WORK, [illegible] of our product. We have used this machine nearly three years and [illegible]

Yours truly,

THE MOSLER BANK SAFE CO.

Peninsular Car Company.

Niles Tool Works, Hamilton, O. DETROIT, MICH., June 15, 1889.

Gentlemen:—Replying to yours of the 6th inst., we have had one of your Arch Bar Drilling Machines in constant use for about three years, and take pleasure in saying it has proven entirely satisfactory to us. Yours truly, C. L. FREER,
Vice-President.

Lafayette Car Works.

Niles Tool Works, Hamilton, O. LAFAYETTE, IND., June 16, 1889.

Gentlemen:—The Arch Bar Drilling Machine purchased from you March, 1886, has given us excellent satisfaction, and we keep it constantly in use. We know of no better drill, and would find it difficult now to get along without it.

Yours truly,
LAFAYETTE CAR WORKS,
B. F. MASTEN, President.

The Springfield Iron Co.

Niles Tool Works, Hamilton, O. SPRINGFIELD, ILL., June 18, 1889.

Gentlemen:—In reply to your favor of the 9th inst., we have to say, that the pair of 3-Spindle Rail Drills you sent us have given us excellent satisfaction. We have had very little trouble with them in the way of repairs or stoppages, and the drilling has been both rapid and accurate. Yours truly,
THE SPRINGFIELD IRON CO.

Ludlow Valve Manufacturing Co.

Niles Tool Works, Hamilton, O. TROY, N. Y., Oct. 18, 1890.

Gentlemen:—Yours of the 14th inst. is received. We are happy to say, we are much pleased with the working of the large Radial Drill furnished by you a year since. It has given us no trouble, has done its work economically and well, and we can heartily recommend it as a first rate tool. Yours truly,
LUDLOW VALVE MANUFACTURING CO.
H. G. LUDLOW, President.

Red Star Line.

SUPERINTENDING ENGINEER'S DEPARTMENT,
Niles Tool Works, Hamilton, O. NEW YORK, Feb. 29, 1889.

Gentlemen:—Yours of the 7th inst. at hand and noted. Would say that we have had in use in our Jersey City machine shop, since May, 1887, a No. 2 Niles Universal Radial Drill. This tool has done excellent work, and continues to fulfill the requirements of this establishment satisfactorily. Its action is good, it runs free, is quickly handled and insures speedy and good work, and apparently will continue to do so for years. It is as good a tool of its kind as I have ever seen, and it gives me pleasure to have this opportunity of recommending its merits.

Yours truly, GEO. CLARKE,
Assistant Superintending Engineer.

The Ball Engine Co.

Niles Tool Works, Hamilton, O. ERIE, PA., Jan. 20, 1891.

Gentlemen:—Replying to yours of the 22d, would say that we have one of your Radial Drills in our machine shop which has given us the very best of satisfaction since we put it in, some two or three years ago, and we will be glad to recommend it to anybody who may wish a good machine. Yours truly, THE BALL ENGINE CO.

Newton Machine Tool Works.

Niles Tool Works, Hamilton, O. PHILADELPHIA, Jan. 26, 1891.

Gentlemen:—I am in receipt of your favor of January 22d, and in reply would say that we have had one of your Radial Drills in operation about four years, and I do not think there has ever been a dollar spent upon it since we have had it. The machine gives us entire satisfaction now, as it did when we received it. Very truly yours, C. C. NEWTON.

Office of A. J. Boyce.

Niles Tool Works, Hamilton, O. EAST LIVERPOOL, O., Jan. 27, 1891.

Gentlemen:—Yours of the 22d at hand, inquiring how we like our Radial Drill purchased from you. In reply will say that it is more than you claimed for it, and it has given us entire satisfaction. We have made a boring mill out of it as well as drill and found it worked like a charm, boring 6-inch holes with all ease and accuracy. I am,

Very truly, A. J. BOYCE.

Robert Wetherill & Co.

Niles Tool Works, Hamilton, O. CHESTER, PA., Jan. 19, 1891.

Gentlemen:—Replying to your letter of the 7th inst., we have now had in daily use for some time one of your Improved Universal Radial Drilling Machines, and have pleasure in informing you of the entire satisfaction it is giving us in all classes of work we are accustomed to have here. Yours truly, ROBT. WETHERILL & CO.

[illegible]

Niles Tool Works, Hamilton, O. [illegible]

Gentlemen:—[illegible] 14-foot Plate Planer [illegible] than satisfied with them. [illegible] certainly have put them [illegible] recommend these tools to any [illegible]

REFERENCES.

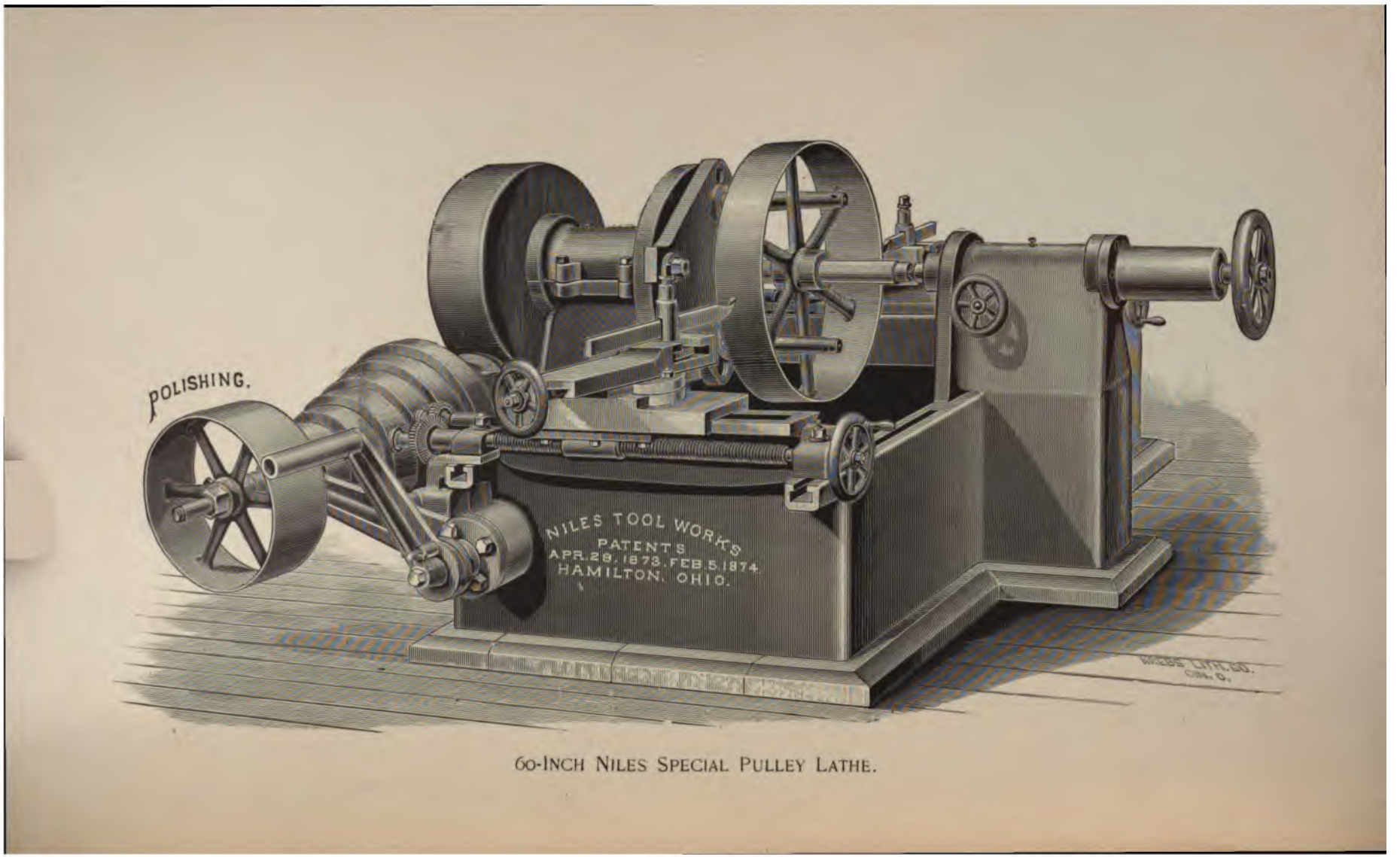
Webster, Camp & Lane, Akron, O.
L. Spence, Martin's Ferry, O.
Chicago, Milwaukee & St. Paul R. R.
Missouri, Kansas & Texas R. R.
James Leffel & Co., Springfield, O.
Kendall & Roberts, Cambridgeport, Mass.
Otis Iron and Steel Co., Cleveland, O.
Crane Bros. Manufacturing Co., Chicago, Ill.
M. C. Bullock Manufacturing Co., Chicago, Ill.
Central Pacific R. R.
New York, Pennsylvania & Ohio R. R.
Griffith & Wedge, Zanesville, O.
Illinois Central R. R.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Wabash, St. Louis & Pacific R. R.
Davidson Steam Pump Co., Brooklyn, N. Y.
Pennsylvania Company.
Cincinnati, New Orleans & Texas Pacific R. R.
Kentucky Central R. R.
Ludlow Valve Manufacturing Co., Troy, N. Y.
Deane Steam Pump Co., Holyoke, Mass.
DeLavergne Refrigerating Machine Co., N. Y.
Mexican National Railway.
C. & G. Cooper & Co., Mt. Vernon, O.
Black & Clawson Co., Hamilton, O.
Hooven, Owens & Rentschler Co., Hamilton, O.
The Long & Allstatter Co., Hamilton, O.
P. H. & F. M. Roots Co., Connersville, Ind.
Alabama Great Southern R. R.
St. Joseph Terminal Co.
Lehigh Valley R. R.
Lebanon Manufacturing Co., Lebanon, Pa.
Robert Wetherill & Co., Chester, Pa.
Shickle, Harrison & Howard Iron Co., St. Louis, Mo.
Gordon, Strobel & Laureau, Philadelphia, Pa.
Morgan Engineering Co., Alliance, O.
Denver & Rio Grande R. R.
St. Louis Iron and Machine Co., St. Louis, Mo.
Dickson Manufacturing Co., Scranton, Pa.
Texas Pacific R. R.
Ramapo Iron Works, Hillburn, N. Y.
Ajax Forge Co., Chicago, Ill.
Morden Frog and Crossing Works, Chicago, Ill.
Springfield Iron Co., Springfield, Ill.
Peninsular Car Co., Detroit, Mich.
Missouri Car and Foundry Co., St. Louis, Mo.
Michigan Central R. R.
Mt. Vernon Car Co., Mt. Vernon, Ill.
Pullman Palace Car Co.
Paige Car Wheel Co., Cleveland, O.
Canadian Pacific R. R.
Norfolk and Western R. R.
New York, Chicago & St. Louis R. R.
Northern Pacific R. R.
New York, Philadelphia & Norfolk R. R.
St. Paul, Minneapolis & Manitoba R. R.
A. & P. Roberts & Co., Philadelphia, Pa.
Delaware and Hudson Canal Co.
Little Rock & Fort Smith R. R.
Chicago, St. Paul, Minn. & Omaha R. R.
Eastern Railway of Minnesota.
Joliet Steel Co., Joliet, Ill.
Illinois Steel Co., Joliet, Ill.
Pittsburg, Cincinnati & St. Louis R. R.
Chicago, St. Louis & Pittsburg R. R.
Baltimore & Ohio R. R.
East Tennessee, Virginia & Georgia R. R.
Holyoke Machine Co., Worcester, Mass.
Litchfield Car and Mach. Co., Litchfield, Ill.
Roanoke Machine Works, Roanoke, Va.
Sioux City Foundry and Machine Works, Sioux City, Iowa.
Armington & Sims Engine Co., Providence, R. I.
Central Railway of Georgia.
Memphis and Little Rock Railway Co.
Lidgerwood Manufacturing Co., N. Y.
Ball Engine Co., Erie, Pa.
Mobile & Ohio R. R.
Southern Pacific R. R.
Central Iowa Railway.
Otis Bros. & Co., New York, N. Y.
Newton Machine Tool Works, Phila., Pa.
A. J. Boyce, East Liverpool, O.
Delaware, Lackawanna & Western R. R.
E. L. Dent & Co., Washington, D. C.
Bucyrus Foundry and Machine Works, Bucyrus, O.
Warder, Bushnell & Glessner, Spr'field, O.
H. K. Porter & Co., Pittsburg, Pa.
Stevenson & Co., Wellsville, O.
Richmond Locomotive and Machine Works, Richmond, Pa.
Harlan & Hollingsworth Co., Wilmington, Del.
Carlisle Manufacturing Co., Carlisle, Pa.
Lima Machine Works, Lima, O.
Louisville & Nashville R. R.
La Grange Mills, La Grange, Ga.
Brush Electric Co., Cleveland, O.
Union Pacific R. R.

PART IX.

PULLEY MACHINERY.

NILES TOOL WORKS,

HAMILTON, OHIO.



60-INCH NILES SPECIAL PULLEY LATHE.

PART IX.

Niles Special Pulley Lathes.

(Patented April 29, 1873, and February 5, 1884.

SPECIALLY designed for turning pulleys, gears (both spur, beveled, and mortised), small fly-wheels, and work of a similar character. As will be seen from the cut, these Lathes are very strongly built. The bed is made especially wide, and the spindle placed very low in order to avoid the high tool posts otherwise necessary, and which are always a source of annoyance where heavy duty is required.

Power is transmitted to the spindle through tangent gearing, giving a steady and powerful motion, particularly desirable when turning off the face of gears, and similar work.

The pulleys, being first bored, are placed on a mandrel and are driven by an equalizing driver of the Clement type, distributing the strain evenly on the arms. This method of driving is far preferable to any method of clamping to a face-plate by the arms without the use of a mandrel, as it is almost impossible to produce true work by such methods.

The tool slides are mounted upon short, stiff cross rails, which are adjustable on graduated surfaces of the bed to suit the diameter of pulley to be turned. The rails may be set over at an angle to give any desired degree of "crown." Tools are thus operated on both sides of the machines.

Feeds are operated from the end of the driving shaft by three step cones for 1½-inch belt, communicating power to the feed shaft by means of gears with an in-and-out pin. This arrangement gives a roughing and finishing feed for each adjustment of feed belt. The front rest has compound movement and power cross and angle feed.

The driving shaft runs at so much higher velocity than the main spindle that its speed is suitable for polishing while the Lathe is turning. A steel mandrel and suitable rest are provided for this purpose, and both operations are performed at the same time.

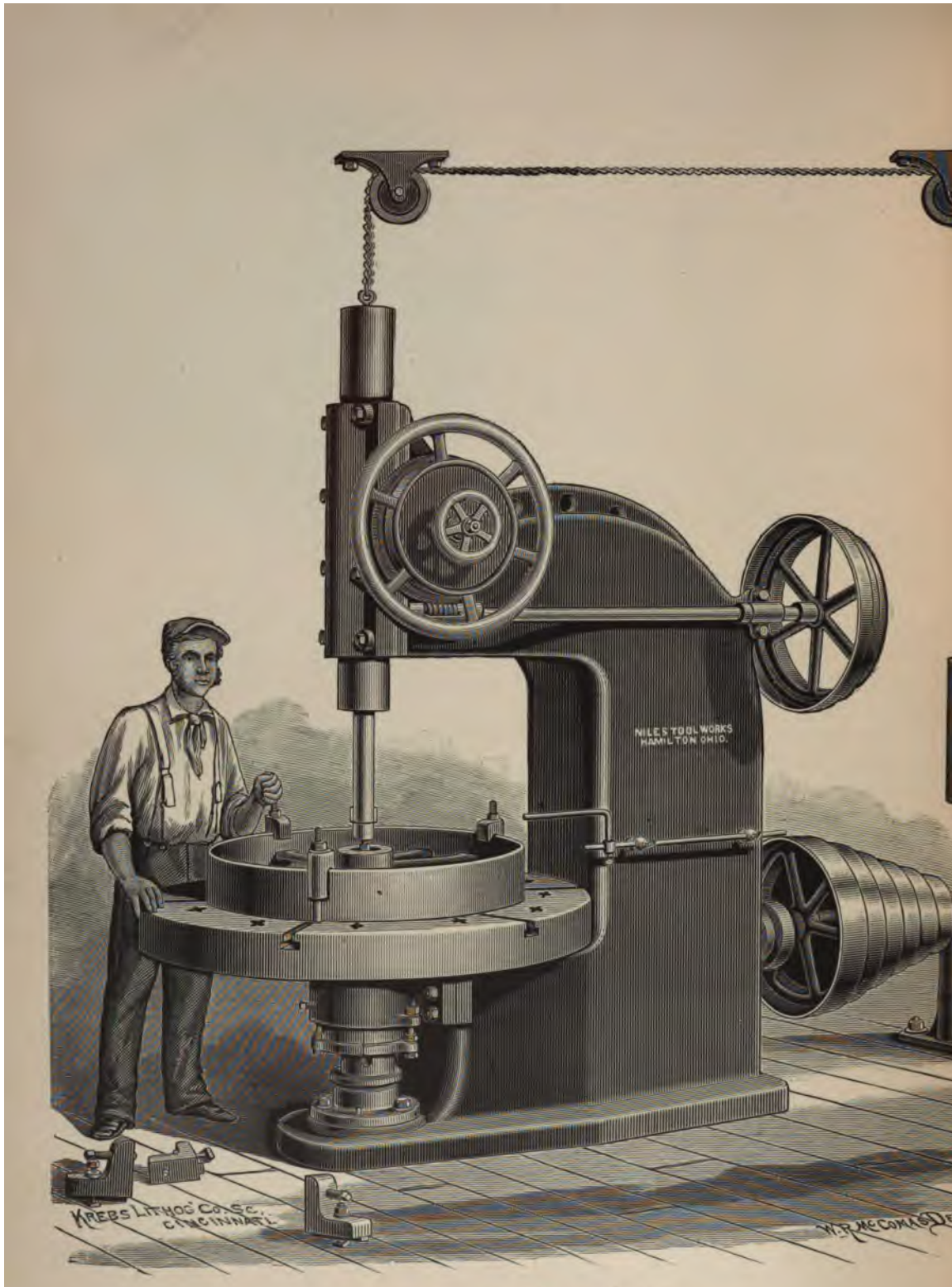
We build three sizes, as follows:

40-INCH LATHE.—Will turn pulleys, etc., from 10 to 40 inches diameter, any width of face up to 16 inches.

50-INCH LATHE.—Will turn pulleys, etc., from 12 to 50 inches diameter, any width of face up to 24 inches.

60-INCH LATHE.—Will turn pulleys, etc., from 12 to 60 inches diameter, any width of face up to 24 inches.

	40-INCH.	50 AND 60-INCH.
Diameter countershaft pulleys,	18″	20″
Width of face,	5″	5¼″
Revolutions per minute,	210	175



NILES SPECIAL BORING MACHINE.

Niles Special Boring Machine.

DESIGNED specially for boring pulleys, gears, or other objects. A companion machine to our Special Pulley Lathe. The two machines form a set for boring, turning and polishing pulleys, that can not be equaled for rapidity and excellence in executing this work. The face plate is revolved by powerful gearing driven by a cone with six steps for a belt 4 inches wide. The boring bar has [illegible] inches traverse; has automatic feed and quick return.

The feeds are operated by belt and have three changes.

One tool holder, a set of chuck jaws, and a set of special clamps for holding pulleys are furnished with each machine.

In addition to their value as a special machine for boring pulleys, the machines are adapted to a wide range of work and can be used to [illegible] advantage on a large variety of general machine shop boring jobs. They will accomplish such work vastly cheaper than any lathe. They are in use [illegible] in a large number of shops, working upon almost anything within [illegible] They will bore cylinders up to 12 inches with all the accuracy, and [illegible] a special cylinder borer. We [illegible] shop can employ. Setting and [illegible] done in much less time than [illegible] testimonials of purchasers [illegible]

They are built [illegible]

50-INCH BORING MACHINE, [illegible] 24 inches high.

60-INCH BORING MACHINE, [illegible] 24 inches high.

Correspondence [illegible]

Special [illegible]

Capacity of Niles Special Pulley Machines.

ONE man can operate both the Turning and Boring Machines. The machines are so simple in construction, and so easily operated, that they do not require the attention of a skilled mechanic. A man of ordinary intelligence can soon be taught to run them successfully, and get out the full complement of work.

We have actual data of work finished in ten hours on our machines, as follows:

40	Pulleys,	16″ diameter,	4″ face.
18 to 20	"	30″ "	8″ "
8	"	48″ "	8″ "
6	Fly-wheels,	42″ "	10″ "

Fly-wheels with heavy rims, turned on both face and sides.

At $2.00 per day, the labor of boring and turning a 30-inch pulley would cost from ten to fourteen cents.

An ordinary merchantable pulley of this size weighs about 120 pounds. At three cents per pound the casting would cost $3.60. Taking cost of labor finishing, as above, at fourteen cents, and for drilling, tapping and set-screws ten cents, makes the cost of the finished pulley $3.84. The list price is $13.00; at 40 per cent. discount the net price is $7.80. Allow a fair amount for shop expenses and there remains a large margin for profit.

The above figures are not exceptional, but are a fair statement of the work done on these machines.

This record is unprecedented, and certainly warrants an investment in such special machinery.

Cylinder Lathe.

FOR TURNING PRINTING PRESS CYLINDERS, DRY ROLLS OF PAPER MACHINES, AND WORK OF SIMILAR CHARACTER.

OF same general construction as our Pulley Lathes.

Swings 41 inches diameter, and will turn any length up to 7 feet between centers. The machine is provided with two tool carriages moving longitudinally on cross rails on either side of the machine.

For turning printing press cylinders, where a portion of the cylinder is of smaller diameter, a third tool rest, with independent adjustment, is placed on the front cross rail for turning the smaller diameter. This rest is provided with a hinged apron, similar to the tool apron of a planer, and by means of connections to the face plate of the Lathe it is thrown into position for cutting, and withdrawn at the proper time. Thus the entire cylinder is turned at the same time, three tools being at work.

Power is transmitted through tangent gearing of large diameter and heavy pitch, insuring a smooth, steady motion, free from chatter, a very desirable thing in this class of work.

Driving cone has six steps, ranging in diameter from 17 to 32 inches, for 4-inch belt.

The cross rails are set parallel with each other on the bed, and are adjustable to and from the center for different diameters, being moved simultaneously by screws at each end of the rail, insuring exact parallelism of rails at all times.

There are four changes of feed, giving ample range for all requirements.

The entire machine is heavy and substantial, with ample power, and arranged for convenient and easy operating.

Countershaft, [illegible] and fast and loose

TESTIMONIALS AND REFERENCES.

TESTIMONIALS.

Iowa Iron Works.

Niles Tool Works, Hamilton, O. DUBUQUE, IOWA, Feb. 4, 1891.

Gentlemen:—The Pulley Machines and 14-foot Boring Mill, purchased from you several years ago, have been in constant use ever since and are giving excellent satisfaction.

Yours truly, IOWA IRON WORKS,
F. L. DICKEY, Sec. and Treas.

The John T. Noye Manufacturing Co.

Niles Tool Works, Hamilton, O. BUFFALO, N. Y., Feb. 4, 1891.

Gentlemen:—Your letter of the 29th ult. is at hand. The Pulley Machines of your make which we have had in use in our works for some time, have done all that you have claimed for them and have been very satisfactory in their operation.

Yours truly,
THE JOHN T. NOYE MFG. CO.

Hoffman & Billings Manufacturing Co.

Niles Tool Works, Hamilton, O. MILWAUKEE, WIS., Oct. 23, 1890.

Gentlemen:—The Pulley Machines you furnished us some time ago have been doing good work since being placed in position, and we can unhesitatingly recommend your make of Pulley Machines, to be first-class tools in every respect. Yours very truly,

J. B. KALVELAGE,
Secretary.

Diamond Iron Works.

Niles Tool Works, Hamilton, O. MINNEAPOLIS, MINN., Feb. 4, 1891.

Gentlemen:—In reply to your inquiry of January 29th, we can say we are more than satisfied with the 50-inch Pulley Lathe which you sold us. We believe it has more than paid for itself already. This machine and the others which you have furnished have helped materially to strengthen the conviction which we have always held, viz.: That in order to do good work it is necessary to have good tools. The Lathe is especially satisfactory because of the quantity, as well as the quality, of work turned out. Yours truly, SMITH & RICHARDSON.

The Case Manufacturing Co.

Niles Tool Works, Hamilton, O. COLUMBUS, O., June 16, 1889.

Gentlemen:—We have been using your Pulley Boring and Turning Machinery for over a year. We are highly pleased with both machines. After having them once in place it has given us no trouble whatever to operate them—no breakage, friction or other annoyances. We can turn 22 pulleys 18 inches diameter, 6½ inches face, in ten hours. The Boring Machine is almost unlimited in capacity. We are highly pleased with the purchase we made of you, and consider it money well invested. Wishing you abundant success, we remain,

Yours truly, THE CASE MFG. CO.
J. F. OGLIVEE, Sec. and Treas.

The Filer & Stowell Co.

Niles Tool Works, Hamilton, O. MILWAUKEE, WIS., June 7, 1889.

Gentlemen:—Referring to yours of the 6th, would say that the two Pulley Turning Machines, 50 and 36-inch, have been used about four years. Although the works have been running night and day, and all the other tools crowded for all they would stand, we have never been able to keep these machines running full day time. We have no special record of work done on them. They, as well as the 10-foot Boring Mill, have given the very best of satisfaction.

Yours truly,

THE FILER & STOWELL CO.,
T. J. NEACY, Manager.

Smith, Myers & Schnier.

Niles Tool Works, Hamilton, O. CINCINNATI, Jan. 26, 1891.

Gentlemen:—We are in receipt of your favor of the 23d inst., and in reply would say we have had a pair of your 50-inch Pulley Boring and Turning Machines in use for the past two years and it gives us much pleasure to say we are perfectly satisfied. The machines do their work better than any we have ever seen, and we will take great pleasure in showing them to any person you may send us, and in answering inquiries regarding them.

Yours truly,

SMITH, MYERS & SCHNIER,
E. H. MYERS.

Stilwell & Bierce Manufacturing Co.

Niles Tool Works, Hamilton, O. DAYTON, O., Jan. 24, 1891.

Gentlemen:—We have your favor of the 23d, and in reply would say that it gives us pleasure to bear testimony to the merits of your Pulley Machinery. We have had one of your Pulley Borers, and also your Pulley Lathe, in use for a number of years, and have turned out a very large amount of work on them in a highly satisfactory manner. We congratulate you on your enterprise in keeping to the front in your line of business, and we hope you will continue to receive a large share of business, which such enterprise and industry merits.

Yours truly,

STILWELL & BIERCE MFG. CO.

Morris Machine Works.

Niles Tool Works, Hamilton, O. BALDWINSVILLE, N. Y., June 14, 1888.

Gentlemen:—We have had your Pulley Borer and Pulley Lathe in use for some time and can not speak too highly in regard to their construction and efficiency. We have done a large variety of work on them, principally upon the Borer, where connecting-rod ends, eccentrics, couplings, pulleys, pump primers, etc., are bored, and, in fact, anything in which a true hole is desired can be placed on the face plate. On account of the variety of work we have been unable to keep time on any sized pulleys, but we are confident we can bore and turn a pulley in much less time than it formerly took us to chuck one on the boring mill. The pulleys, when bored, we find much truer than when bored and turned on a boring mill, which is of vital importance to engine builders. We do not know how we could get along without the machine were it impossible to get others. They are first-class tools and reflect much credit on the makers.

Yours very truly,

MORRIS MACHINE WORKS.

REFERENCES.

Smith & Richardson, Minneapolis, Minn.
Tuttle Mfg. & Supply Co., Anaconda, Montana.
Waters-Allen Foundry & Machine Co., Nashville, Tenn.
J. & C. G. Bolinders, Stockholm, Sweden.
Smith, Myers & Schnier, Cincinnati, O.
A. J. Boyce, East Liverpool, O.
The P. H. & F. M. Roots Co., Connersville, Ind.
Wilkin Manufacturing Co., Milwaukee, Wis.
Robert Poole, Son & Co., Baltimore, Md.
Hill Clutch Works, Cleveland, O.
Eagle Iron Works, Detroit, Mich.
Missouri Car and Foundry Co., St. Louis, Mo.
American Brake Co., St. Louis, Mo.
Kilbourne & Jacobs Mfg. Co., Columbus, O.
Coxe Bros. & Co., Drifton, Pa.
Ohio River R. R.
E. M. Birdsall Co., Auburn, N. Y.
Berlin Anhaltische Maschienenbau-Actien Gesellschaft, Berlin, Germany.
C. G. Haubold, Jr., Chemnitz, Saxony.
Stilwell & Bierce Mfg. Co., Dayton, O.
Willamet Iron Works, Portland, Ore.
Sioux City Foundry & Machine Co., Sioux City, Ia.
E. Van Winkle & Co., Atlanta, Ga.
Joseph Enright, San Jose, Cal.
Walker Manufacturing Co., Cleveland, O.
Flynn & Emrich, Baltimore, Md.
Morris Machine Works, Baldwinsville, N. Y.
Columbus Machine Co., Columbus, O.
Benj. Eastwood, Paterson, N. J.
Edison Machine Co., New York.
Munson Bros., Utica, N. Y.
Keystone Iron Works, Kansas City, Mo.
Carnegie, Phipps & Co., Pittsburg, Pa.
P. Pryibil, New York.
P. Griffiths, Philadelphia, Pa.
Walter Scott & Co., Plainfield, N. J.
Geo. V. Cresson, Philadelphia, Pa.
Frost Manufacturing Co., Galesburg, Ill.
Filer and Stowell Co., Milwaukee, Wis.
Standard Foundry Co., St. Louis, Mo.
Frazer & Chalmers, Chicago, Ill.
C. G. McMurray, Hartford, Conn.
Dickson Manufacturing Co., Scranton, Pa.
A. Piamondon Manufacturing Co., Chicago, Ill.
Great Western Mfg. Co., Leavenworth, Kan.
Atlas Engine Works, Indianapolis, Ind.
E. P. Allis & Co., Milwaukee, Wis.
Talbott & Sons, Richmond, Va.
Fulton Foundry, San Francisco, Cal.
Speedwell Iron Works, Glasgow, Scotland.
E. Leonard & Sons, London, Ontario.
Lidgerwood Manufacturing Co., New York.
Crane Bros. Mfg. Co., Chicago, Ill.
Thos. Wood, Philadelphia, Pa.
Jas. Smith Woolen Mach'y Co. Phila., Pa.
Columbus Iron Works Co., Columbus, Ga.
Buckeye Engine Co., Salem, O.
A. & F. Brown, New York.
Frick Co., Waynesboro, Pa.
Geiser Manufacturing Co., Waynesboro, Pa.
Thos. R. Reeve, Clinton, Iowa.
Variety Iron Works, Cleveland, O.
Sinker, Davis & Co., Indianapolis, Ind.
W. McGregor & Co., Chicago, Ill.
Blymyer Manufacturing Co., Cincinnati, O.
Pray Mfg. Co., Minneapolis, Minn.
Williams & Orton Mfg. Co., Sterling, Ill.
Barney & Kilby, Sandusky, O.
North Star Iron W'ks, Minneapolis, Minn.
Robt. Gardner & Son, Montreal, Can.
Hoyt & Bro. Mfg. Co., Aurora, Ill.
Jones & Laughlins, Pittsburg, Pa.
Wm. Clark & Co., Pittsfield, Mass.
W. Ropes & Co., St. Petersburg, Russia.
M. C. Bullock Mfg. Co., Chicago, Ill.
Novelty Mfg. Co., Depere, Wis.
American Tool & Mach. Co., Boston, Mass.
Excelsior Iron Works, Chicago, Ill.
D. J. Murray, Wausau, Wis.
Grainger & Co., Louisville, Ky.
T. R. Reeves, Cleveland, O.
H. Dudley Coleman & Bro., N. Orleans, La.
Goldie & McCullough Manufacturing Co., Gault, Ont.
B. W. Payne & Sons, Corning, N. Y.
Armington & Sims Engine Co., Providence, R. I.
Buffalo Forge Co., Buffalo, N. Y.
Valk & Murdoch, Charleston, S. C.
Iowa Iron Works, Dubuque, Iowa.
Crocker, Pell & Boardman, Min'polis, Minn.
Westinghouse Machine Co., Pittsburg, Pa.
Crowell Mfg. Co., Green Castle, Pa.
Thos. Camp, Covington, Ga.
I. & E. Greenwald, Cincinnati, O.
Holyoke Machine Co., Holyoke, Mass.
Ottumwa Iron Works, Ottumwa, Iowa.
Warren Springer, Chicago, Ill.
Jno. T. Noye Mfg. Co., Buffalo, N. Y.
Thos. Shanks & Co., Johnstone, near Glasgow, Scotland

PART X.

POWER BENDING ROLLS.

NILES TOOL WORKS,

HAMILTON, OHIO.

PART X.

Bending and Straightening Rolls.

WE are frequently asked for prices on bending rolls where the width of the sheet only is specified. The thickness of plate is also an important factor, as also the diameter of the circle to which it must be bent.

We make three different styles of bending rolls, suited to different widths and thickness of plates.

In the first style the machine consists of three rolls. Two of these are placed one over the other and are geared together. The lower roll is adjustable for plates of different thickness. The bending roll is placed at the back and is moved in inclines in the housings. Both ends are raised and lowered by power at the same time, but one end is adjustable independently of the other.

In this arrangement the initial rolls, being geared together, pinch the sheet tightly and carry it through without slippage.

One bearing of the upper roll is movable, and may be thrown back to remove flue rings.

We recommend this form of rolls as most desirable for bending light boiler plate and tank iron, but the adjustability of the feeding rolls for different thickness of plate must be small on account of their being geared together.

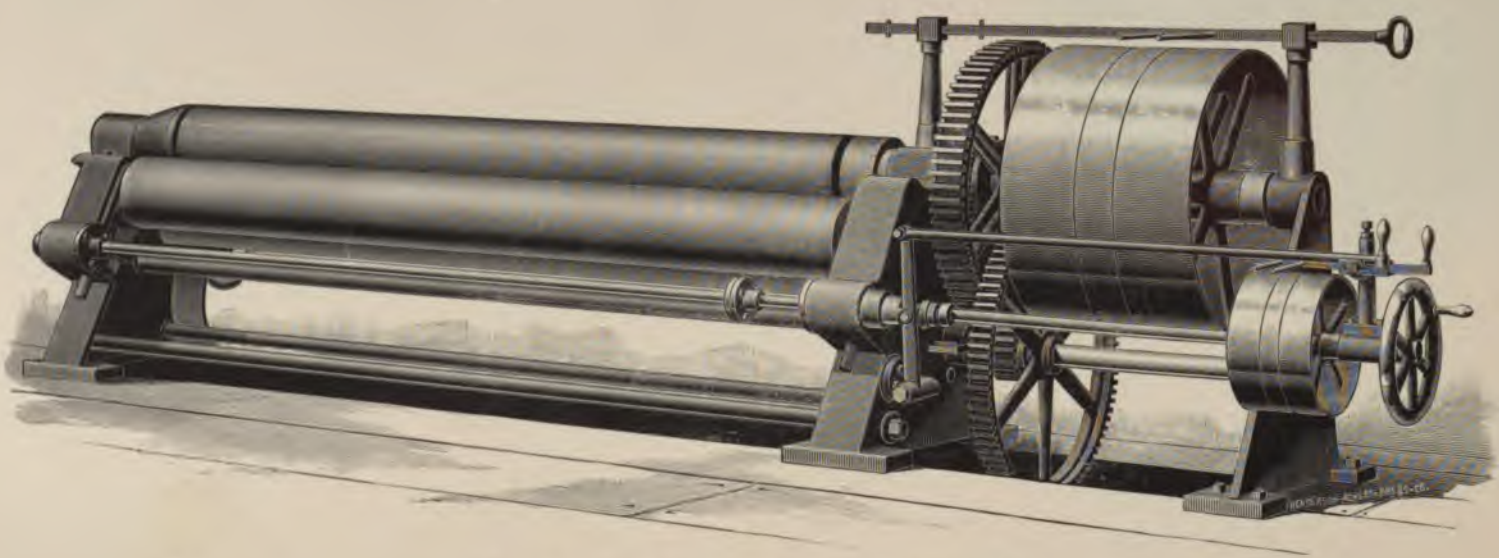
In the second style of construction, which we employ for the wider and heavier range of plates, the machine consists of three rolls placed in pyramid form, with the two lower rolls geared together, and the bending roll on top, which runs by friction.

The upper roll is raised and lowered by power to suit the thickness of plate or diameter of bend. It is operated in the same manner as the back roll in the first style.

In this construction, also, one bearing of the upper roll is movable to permit the removal of rings.

This form of rolls is preferable for wide plates of medium thickness. The weight of the plate is generally sufficient to drive the upper roll.

For bending the heaviest class of plates, such as are used in ship building, we recommend use of four rolls. In this construction two rolls are placed one over the other, are adjustable by power for thickness of plate, and both are driven. The bending rolls are placed one on each side and move in inclined ways in the housings. They will curve the sheet almost to the edge, leaving only a short straight end.



NO. 3 POWER BENDING ROLLS—BACK VIEW.

No. 2 Power Bending Rolls.

THESE Rolls are made from 4 to 6 feet long between housings, and are designed for rolling boiler plates and tank iron up to ⅜-inch thick.

Feeding rolls are placed one over the other and geared together.

The bending roll is placed at the back and moves in inclined ways in the housings.

Each end can be raised or lowered, singly or both together, by power.

One bearing of the upper roll is pivoted so that it can be swung out of the way.

The rolls are wrought iron, 6 to 7½ inches diameter.

Countershaft pulleys 24 inches diameter, 6 inches face.

Speed, 160 revolutions.

Elevating countershaft pulleys 12 inches diameter, 2½ inches face.

Speed, 300 revolutions.

No. 3 Power Bending Rolls.

THESE Rolls are made from 6 to 10 feet long between housings, and are also designed for boiler plate and tank iron up to ⅜-inch thick.

They are of same general style as the No. 2 machine, but are more strongly geared.

Initial rolls are made of wrought iron, 8⅛ to 10 inches diameter, according to length.

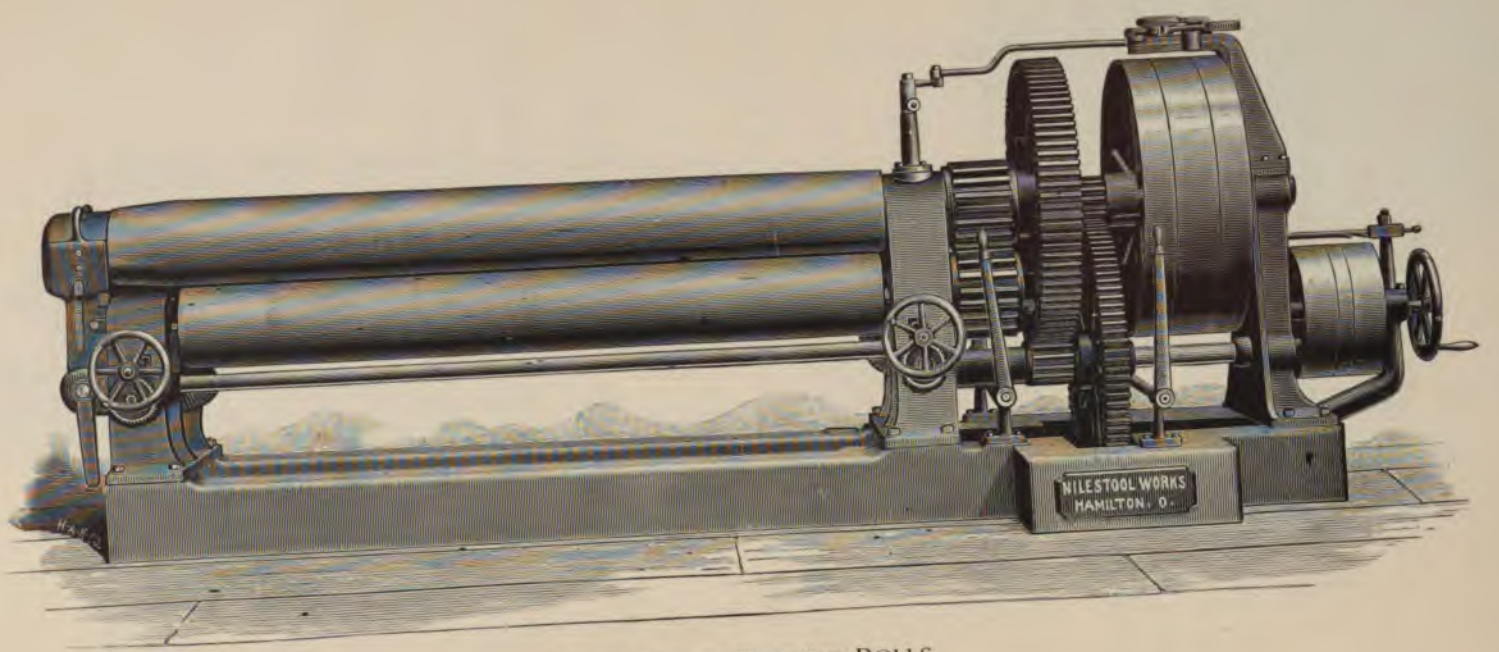
The back roll is cast iron, 10½ inches diameter.

The housings are independent and must be secured to foundation.

Countershaft pulleys 24 inches diameter, 7 inches face.

Speed, from 150 to 170 revolutions, according to size of roll.

Elevating pulleys as in No. 2 machine.



NO. 4 POWER BENDING ROLLS.

No. 4 Power Bending Rolls.

THIS machine is made in lengths from 10 to 14 feet. It is very heavy and powerful, and is capable of bending plates up to ¾-inch thick, when not of extreme width.

The initial rolls are placed one directly over the other, as in the previously described machines.

Bending roll is placed at the back and is operated by either hand or power.

The initial rolls are adjustable for thickness of plate.

One bearing of the upper roll is pivoted on the housing and can be thrown back out of the way.

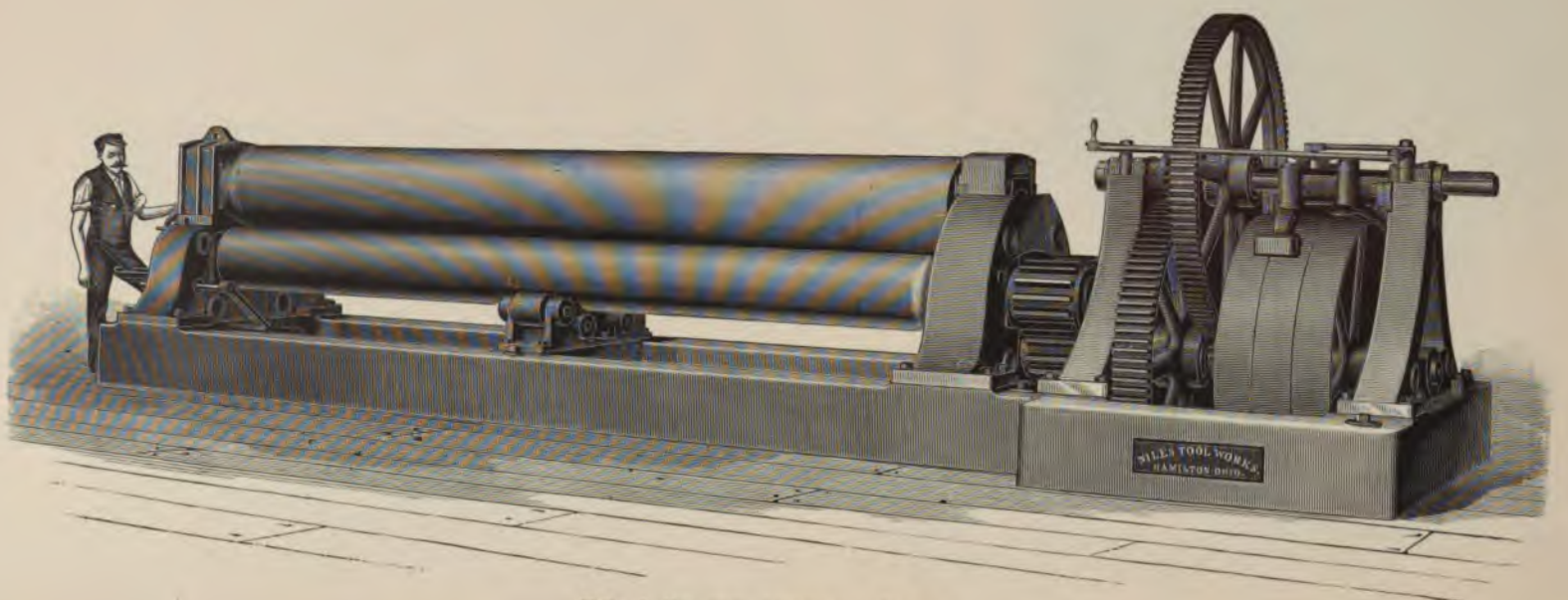
The rolls are from 12 to 14 inches diameter, according to length and thickness of plate to be bent. Initial rolls are wrought iron. The back roll is cast iron. They are very strongly geared for heavy service.

The machine sets on a substantial base, making it comparatively independent of its foundation.

Countershaft pulleys are 26 inches diameter, 6¼ inches face.

Speed, 200 revolutions per minute.

When desired, we arrange these machines to be driven by a pair of reversing engines instead of the driving pulleys.



NO. 6 POWER BENDING ROLLS.

No. 5 Power Bending Rolls.

THIS machine is for bending plates 5/8 to 3/4-inch thick, and from 10 to 12 feet in width.

The rolls are arranged in pyramid form, the bending roll on top and the two lower rolls geared together. All rolls are of wrought iron. Bending roll is 14 inches, and lower rolls are each 11 inches in diameter.

The bending roll has a movable bearing at one end and projects beyond the housing at the other end, where it can be depressed by means of a screw for the purpose of removing rings.

The machine is mounted on a heavy base and is arranged to be driven either by belt or engines.

No. 6 Power Bending Rolls.

THIS machine is made from 16 to 20 feet in length, and is intended for heavy plates.

The rolls are arranged in pyramid form and are all of wrought iron. They range from 15 to 21 inches diameter, according to the thickness of plate to be bent. The longer sizes have supporting rolls midway between housings. In extreme cases this support is carried over the top roll and the upper part can then be removed when desired.

One bearing of upper roll is removable for rings.

Countershaft pulleys are 36 inches diameter, 10 inches face.

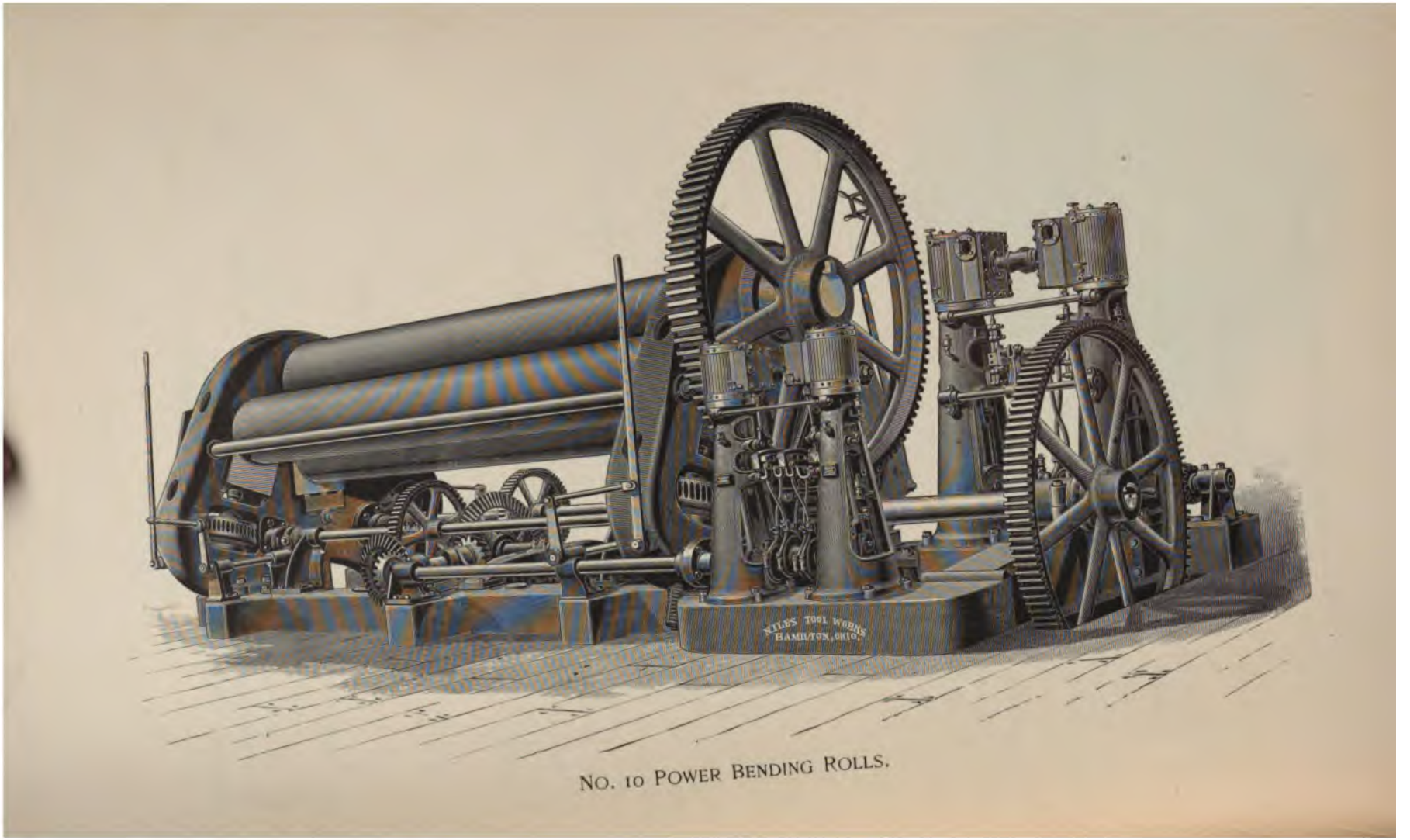
Speed, 230 revolutions.

Machine can be driven by engines if desired.

No. 8 Power Bending Rolls.

THIS machine is designed for bending ship and boiler plate up to 1 1/4 inches thick and 20 feet in length. It is of same general style as No. 6, but much heavier. It is furnished with a pair of reversing engines for driving and operating the various movements.

Supporting rolls are placed midway between housings, and a yoke is added on largest sizes.



NO. 10 POWER BENDING ROLLS.

No. 10 Power Bending Rolls.

FOR SHIP PLATE.

WILL bend plate iron up to 1½ inches thick, and 16 to 22 feet long.

This machine has four rolls—two central rolls, one placed above the other, and two side rolls moving in inclines on either side, adjustable to suit the diameter to be bent.

The rolls are all solid wrought iron forgings. The center rolls 26 inches diameter, the side rolls 22 inches diameter.

The center rolls are driven by a pair of reversing engines, running them in either direction.

The side rolls are raised and lowered by an independent reversing engine. These rolls may be operated together or separately, or either end of either roll may be raised independently, as may be required.

The housings supporting the rolls are very strong and substantial. The journal bearings of the rolls are of very large diameter and fitted into bearings set into the housings.

The entire machine is mounted on a very heavy sole-plate provided with anchor-bolt holes to secure it to the foundation.

The machine will bend ship plates, curving them in any manner required, and has ample power and strength to do the work expeditiously.

A machine constructed in this manner, with four rolls, curves the sheet almost up to the edge, leaving only a short straight end. This is specially important when working heavy plates such as the machine will bend.

The machine is intended to be set in a pit, upon a solid foundation. All reversing and operating levers, etc., are brought above the floor line, which should be about the height of the cross girt.

No. 12 Power Bending Rolls.

FOR SHIP PLATE.

THIS machine is 22½ feet between the housings, and will bend plates up to 2 inches thickness. It is similar to No. 10 machine, shown in cut on page 228.

This machine has four wrought iron, forged rolls 22½ feet long between journals, supported in two massive housings.

The two feeding rolls are placed vertically one over the other. They are 32 inches in diameter.

The two bending rolls are placed one on each side of the center rolls. These are 25½ inches in diameter and move in guides in the housings. They are so placed as to move very closely by the lower center roll when the latter is touching the upper roll.

The upper feed roll runs in fixed bearings in the housing.

The lower roll runs in bearings having a vertical adjustment of 5 inches, obtained by means of heavy steel adjusting screws 8 inches in diameter, operated by tangent gearing.

The bending rolls have an adjustment of 20 inches. When in their lowest position the upper surface is 4 inches below the bottom of the upper feed roll, from which position they move upward until they touch the upper feed roll.

The adjusting screws for these rolls are of steel, 7 inches in diameter, and are operated by tangent gearing.

The two bending rolls and the lower feed roll are raised and lowered by a pair of reversing engines which are used for this purpose only.

Clutches are provided in the train of elevating gear for all the movable rolls, so that either one or both ends of any of them can be moved independently.

Safety friction clutches are provided in the gear train of the lower feed roll, which allow the gearing to slip when the feed rolls and plate are pressed tightly together.

Graduated index scales are provided to indicate the exact height of the ends of the rolls.

The two feed rolls are positively geared together from opposite ends. Main gear on each roll is 10 feet diameter, 15 inches face and 5 inches pitch.

They are driven by a pair of reversing engines, whose cylinders are 12 inches diameter and stroke 16 inches.

The machine is mounted on a heavy cast iron sole-plate, 18 inches deep, bedded in a massive stone foundation and sunk to a level of seven feet below the floor line.

The plates are intended to pass through the rolls at a height of 19 inches above the floor.

The reverse levers and throttles for the engines are operated from one common platform erected on the sole-plate, level with the floor, and all clutch and operating levers are brought to a convenient position above the floor.

Weight of machine is 250 tons.

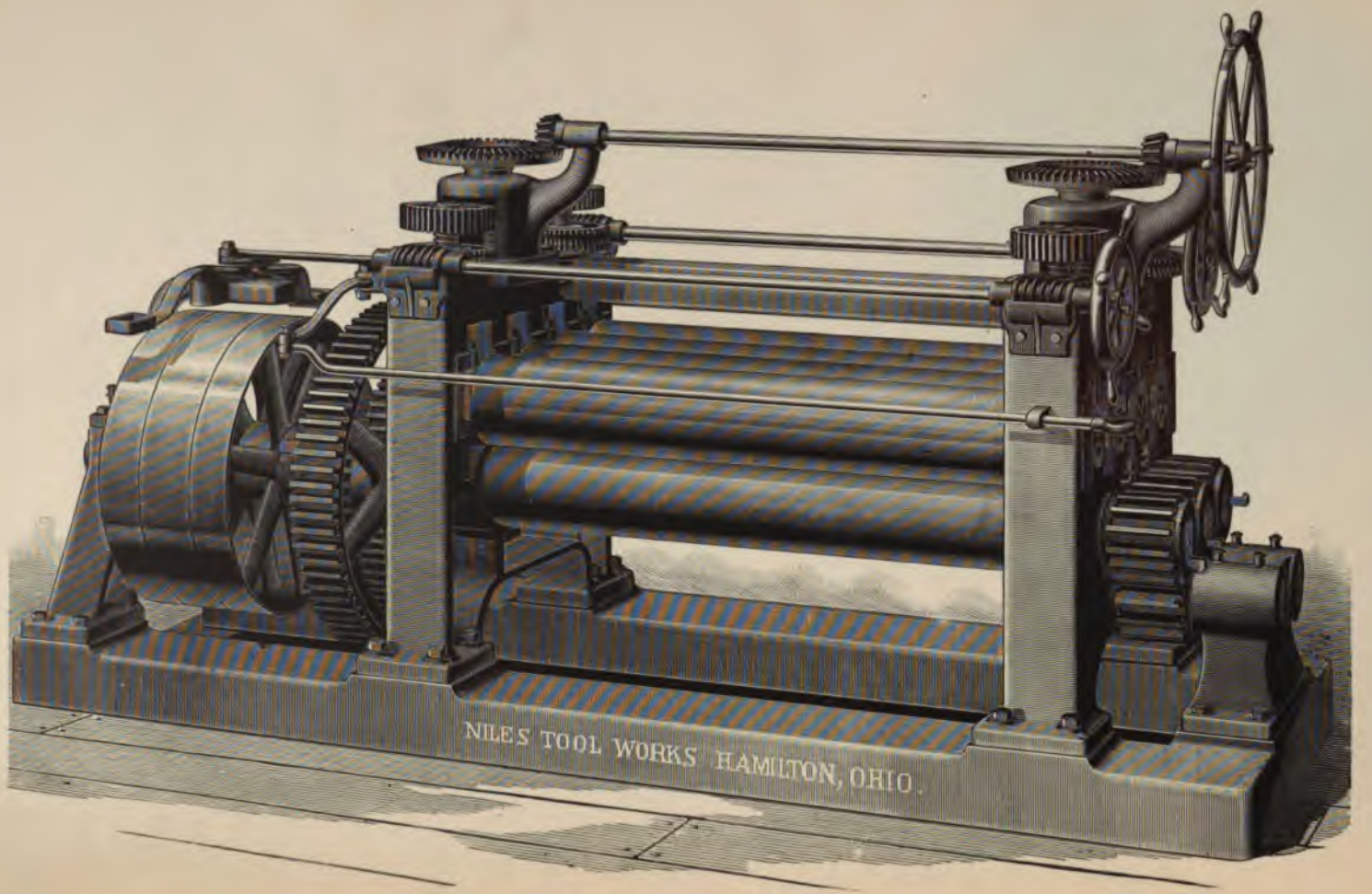


PLATE STRAIGHTENING MACHINE.

Plate Straightening Machine.

THIS machine is designed for straightening plate iron for boilers, tanks, safes, and all other purposes. Such work can be done on this machine perfectly, and at a great saving of labor and expense.

The machine has seven rolls arranged in two tiers—four rolls in the upper tier and three in the lower.

The lower rolls are driven by steel pinions.

The upper series of four rolls are adjustable vertically to suit the thickness of sheet to be straightened. Indexes are provided for setting these rolls. The outer rolls of this series are adjustable independently, the inner rolls are raised or lowered together, and the entire four rolls are also arranged so that, after being once set, they may all be adjusted at the same time without disturbing their relative positions.

All the rolls are steel forgings, of sufficient size to prevent spring. They run in journal bearings of large size, carefully fitted to the housings.

The machine is carried on a base plate, tying it together and therefore requiring but slight foundation.

Driving pulleys are arranged for straight and cross belts, to run the rolls in either direction.

We build a number of sizes for straightening plate from No. 16 to 1 inch thick, as given in the following list:

NO. 1.—Diameter of rolls, 6¾ inches. Length of plate 42 inches. Thickness of plate, from No. 16 to $\frac{5}{16}$-inch.

NO. 2.—Diameter of rolls, 6¾ inches. Length of plate, 60 inches. Thickness of plate, from No. 16 to $\frac{1}{4}$-inch.

NO. 3.—Diameter of rolls, 8 inches. Length of plate 48 inches. Thickness of plate, from $\frac{1}{16}$ to $\frac{1}{2}$-inch.

NO. 4.—Diameter of rolls, 8 inches. Length of plate, 60 inches. Thickness of plate, from $\frac{1}{16}$ to $\frac{1}{2}$-inch.

NO. 5.—Diameter of rolls, 10 inches. Length of plate, 60 inches. Thickness of plate, from $\frac{1}{4}$ to $\frac{5}{8}$-inch.

NO. 6.—Diameter of rolls, 10 inches. Length of plate, 84 inches. Thickness of plate, from $\frac{1}{4}$ to $\frac{1}{2}$-inch.

NO. 7.—Diameter of rolls, 12 inches. Length of plate, 72 inches. Thickness of plate, from $\frac{1}{4}$ to 1 inch.

TESTIMONIALS AND REFERENCES.

TESTIMONIALS.

Craig Ship Building Co.

Niles Tool Works, Hamilton, O. TOLEDO, O., Jan. 31, 1891.

Gentlemen:—In answer to your inquiry in regard to Large Bending Rolls furnished us by you, would say that they have given us good satisfaction and have done all we expected of them up to this time, and we can heartily recommend them as a high graded and good tool.

Yours truly,

CRAIG SHIP BUILDING CO.,
J. F. CRAIG, Secretary.

Office of Myers and Smith.

Niles Tool Works, Hamilton, O. PHILADELPHIA, Feb. 2, 1891.

Gentlemen:—Your inquiry, 29th ultimo, received regarding the merits of the Straightening Rolls bought of you one year ago. We are pleased to say that the results are most satisfactory. They are rapidly paying for themselves in the saving of time and labor. Since starting them, there has not been an hour's delay for repairs. We find that they run smoothly and do their work well. besides being a great saving on our men.

Yours truly, MYERS & SMITH.

The Hoppes Manufacturing Co.

Niles Tool Works, Hamilton, O. SPRINGFIELD, O., Jan. 27, 1891.

Gentlemen:—The Bending Rolls purchased of you in August, 1886, have been in constant use since that time, and we are pleased to report that they are giving us perfect satisfaction. A great part of the work done on our Rolls is the forming of our trough shaped pans for our purifiers. This work requires the constant changing of the back Roll, which is easily and quickly accomplished on these Rolls. We consider your Rolls particularly well adapted to rolling thin and thick sheets, and should we require another set of Bending Rolls we should most certainly get yours.

Very truly yours,

THE HOPPES MANUFACTURING CO.,
E. C. GWYN, Sec'y and Treas.

Office of Joseph F. Wangler.

Niles Tool Works, Hamilton, O. ST. LOUIS, MO., Feb. 3, 1891.

Gentlemen:—We have had in use for the past year, a set of your Power Bending Rolls for 10-foot sheets, driven by a pair of engines which we run independent of our shop engine. The rolls run very nicely and are the best bending rolls I ever saw. They do their work very accurately and are easily regulated by the engines, both in driving the machine and in setting the bending roll. I prefer this style of rolls to the pyramid rolls, for the reason that we can regulate the initial rolls to the thickness of plates and do our work very much faster, as the rolls prevent the plates from slipping. We are well pleased with the rolls and would not part with them for any price if we could not replace them. Yours truly, JOS. F. WANGLER.

Office of F. W. Wheeler & Co.

Niles Tool Works, Hamilton, O. WEST BAY CITY, MICH., August 25, 1890.

Gentlemen:—In reply to yours of August 19th, would say that the Rolls furnished by your company for our new ship building plant are giving excellent satisfaction, and it gives us great pleasure to testify to the excellent workmanship and great power of these Rolls.

Yours very truly,

F. W. WHEELER & CO.,
F. W. WHEELER, President.

The Rogers Locomotive and Machine Works.

Niles Tool Works, Hamilton, O. PATERSON, N. J., Feb. 12, 1891.

Gentlemen:—We have a set of your make of Plate Straightening Rolls which has been in constant use in our tank shop for the past two years, straightening the plates used in locomotive tanks from $\frac{3}{16}$ to $\frac{7}{16}$ inch thick, inclusive, and we take pleasure in saying that it has given us very satisfactory results, and we consider it a good, reliable and economical machine for that purpose.

Yours truly,

REUBEN WELLS,
Superintendent.

The Continental Iron Works.

Niles Tool Works, Hamilton, O. BROOKLYN, N. Y., June 15, 1889.

Gentlemen:—The 16-foot Boiler Rolls furnished us by your company have been in use more than two years and have been perfectly satisfactory. We have rolled a great number of cylinders for corrugated flues and a variety of work on them, unshipping the work with great facility. We can further say that the 8-foot Rolls of your make turn out excellent work.

Yours truly,

THE CONTINENTAL IRON WORKS,
WARREN E. HILL, Vice-President.

The Cleveland Ship Building Co.

Niles Tool Works, Hamilton, O. CLEVELAND, O., Jan. 27, 1891.

Gentlemen:—In answer to your inquiry of how we like the 16 foot Rolls furnished us in August, 1887, we wish to say that they are just what our superintendent wants for ship yard work. We have had no trouble with them and have done a great deal of work on them, rolling plates from the thickest to the thinnest. They are economical in handling, and we can turn out as accurate work on them as any Rolls we have ever used.

Yours truly,

THE CLEVELAND SHIP BUILDING CO.,
H. D. COFFINBERRY, President.

Office of John Mohr & Son.

Niles Tool Works, Hamilton, O. CHICAGO, Jan. 24, 1891.

Gentlemen:—Yours of the 16th inst. received. We take pleasure in answering same. The Plate Planer furnished us some two years ago has been in constant use ever since and has given us the best of satisfaction in every particular. We highly recommend it, and consider it the best tool of its kind in the market. The large 17-foot Rolls have now been in service for the past six years, and we have bent and rolled all thicknesses and sizes of plates in the most satisfactory manner. All the parts are durable and well made and we feel pleased in every way. We beg leave to remain, Yours very truly, JOHN MOHR & SON.

Office of Henry Warden.

Niles Tool Works, Hamilton, O. GERMANTOWN JUNC., PHILADELPHIA, Jan. 28, 1891.

Gentlemen:—Replying to your favor of the 26th inst., it gives us pleasure to state that the Bending Rolls furnished by you in 1887 have, in every way, proved satisfactory.

Yours truly, HENRY WARDEN.

John O'Brien Boiler Works Co.

Niles Tool Works, Hamilton, O. ST. LOUIS, MO., Feb. 17, 1891.

Gentlemen:—In reply to your inquiry in reference to the Bending Rolls you furnished us in 1888, we are glad to say that they are working very satisfactorily, enabling us to turn out our product rapidly and in good shape. By means of the pair of independent engines which you supplied with the machine, its operations are easily and quickly controlled, thus doing away with all countershafting and belting, and the rolls are set with the power of the engines instead of the old style of using the "wrench" in adjusting them. In our machine, the initial rolls are placed one above the other and geared together. The power in driving the plate through is thus made positive, and the rolls pinch the sheet close to the edge, carrying it through without slippage. The bending roll is placed at the back, moving in inclines in the housings to suit the curve desired in the sheet to be bent. We think this machine is much better for light plate than that where the initial rolls are placed on a level and a third roll placed over the space between them, as on our machine light plates are carried through at a uniform speed, which we do not think could be attained without having the rolls between which the plate passes, geared together. We have bent plates ¾ inch thick and 12 feet wide to a circle 30 inches diameter at one pass. We can, therefore, cheerfully recommend this style of rolls to any parties wishing to buy.

Yours truly,
JOHN O'BRIEN BOILER WORKS CO.,
JOHN O'BRIEN, President.

REFERENCES.

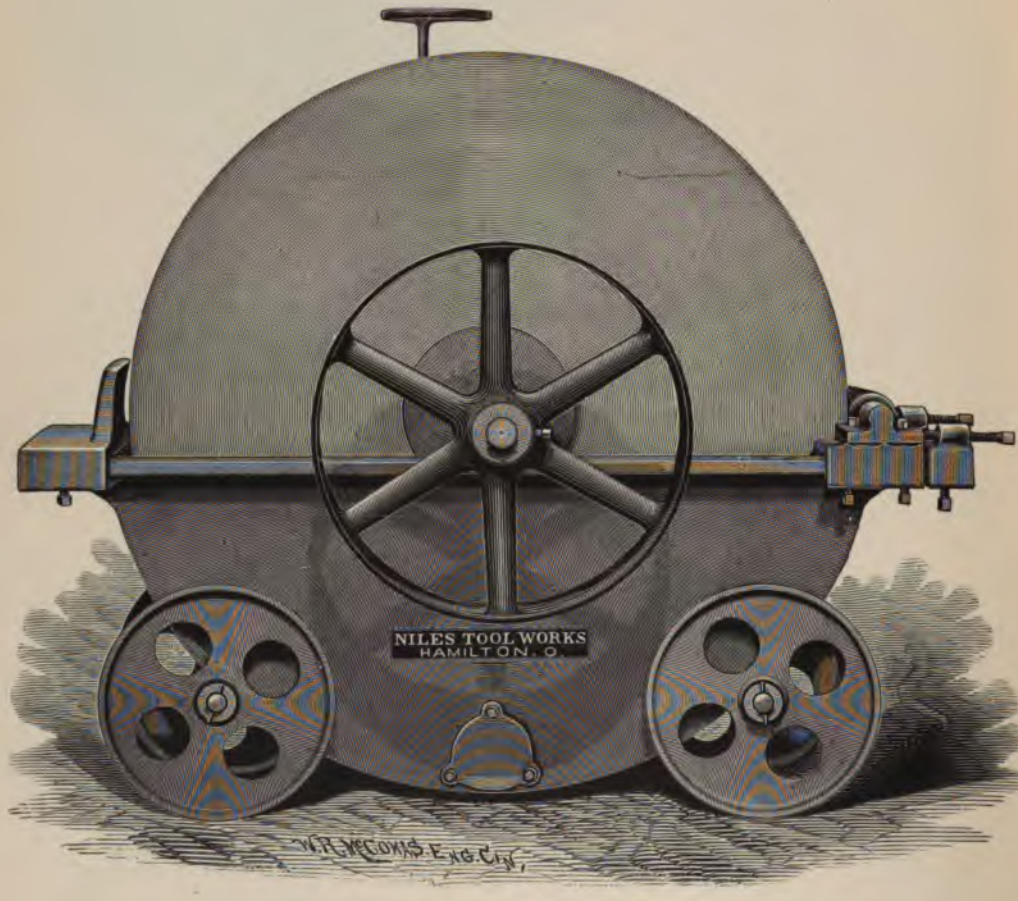
H. K. Porter & Co., Pittsburg, Pa.
Bartlett, Hayward & Co., Baltimore, Md.
Continental Iron Works, Brooklyn, N. Y.
St. Louis, Arkansas & Texas R. R.
Cin'nati, Ind'n'polis, St. Louis & Chicago R. R.
Atlas Engine Works, Indianapolis, Ind.
St. Paul & Duluth R. R.
Herreshoff Manufacturing Co., Bristol, R. I.
Lehigh Valley R. R.
Missouri Pacific R. R.
Southwark F'ndry & Mach. W'ks, Philadelphia.
Henry Warden, Philadelphia, Pa.
Northern Pacific R. R.
Detroit Safe Works, Detroit, Mich.
John Mohr & Son, Chicago, Ill.
Cleveland Ship Building Co., Cleveland, O.
Wm. Cramp & Sons Ship & Engine Bldg Co., Philadelphia, Pa.
Diebold Safe & Lock Co., Canton, O.
Champion Iron Co., Kenton, O.
F. W. Wheeler & Co., West Bay City, Mich.
The Pauly Jail Bldg. & Mfg. Co., St. Louis, Mo.
Van Dorn Iron Works, Cleveland, O.
Mosler Safe & Lock Co., Cincinnati, O.
Baldwin Locomotive W'ks, Philadelphia, Pa.
Myers & Smith, Philadelphia, Pa.
Great Western Iron & Steel Co., Seattle, Wash.
Ohio & Mississippi R. R.
The Stirling Co., New Portage, O.
E. J. Codd Co., Baltimore, Md.
Chicago, Rock Island & Pacific R. R.
Howard-Harrison Iron Co., St. Louis, Mo.
Chicago, St. Louis & Pittsburg R. R.
Columbus, Hocking Valley & Toledo R. R.
Missouri, Kansas & Texas R. R.
Kilby M'f'g Co., Cleveland, O.
Macneale & Urban, Hamilton, O.
Pennsylvania R. R. Co.
Kentucky Central R. R.
Jos. F. Wangler, St. Louis, Mo.
John O'Brien Boiler Works Co., St. Louis, Mo.
Richmond Locomotive & Machine Works, Richmond, Va.
Rogers Locomotive Works, Paterson, N. J.

PART XI.

MISCELLANEOUS.

NILES TOOL WORKS,

HAMILTON, OHIO.



GRINDSTONE BOX.

PART XI.

Grindstone Box.

(Improved Pattern.)

TO TAKE A STONE 4 FEET DIAMETER AND 8 INCHES FACE. ESPECIALLY DESIGNED FOR MACHINE SHOPS.

THERE is no implement more frequently used in a machine shop than a grindstone, and if it is not kept in good condition the consequences are imperfectly ground tools and poor work.

We illustrate a box that will correct all the evils incident to the frames commonly used, and insure the stone being kept in good trim with only ordinary care.

The stone is hung on a square wrought iron arbor, and secured sidewise by large nuts and flanges.

The bearings are large and self-oiling. They will run without attention for weeks.

The grinding rest permits the water running over it to return to the trough.

When the stone becomes smaller, and a change of pulleys is necessary to keep up the speed, the belt need not be cut, but, instead, the box may be moved a few inches to accommodate the change.

When sediment collects the box may be wheeled to the door, the hand-hole plates removed and the box slushed out.

This box will keep your shop neat and tidy, and you will avoid having a mess of sand and water trickling through from one floor to another.

The trough is a single, handsome casting.

Complete weight, 900 pounds.

Shaft Straightening Machine.

THIS machine was designed to meet our own need of a machine which would do away with the nuisance of straightening heavy shafts in the lathe by means of the ordinary screw press sliding on the ways.

Its main features are a long, stiff bed carrying at intervals roller tables which are driven by power. On these the shaft is revolved to test its truth. On the bed is also mounted a heavy, sliding carriage, adjustable to any required position on the bed. On this carriage is mounted a ram, or plunger, which is driven by a cam through the means of a spur gear and pinion, and splined shaft communicating power from a driving pulley at one end of the machine. This ram is adjustable by a screw operated by a large hand wheel.

In operating, the shaft is first revolved to indicate the crooked places. The carriage is then adjusted to suit these places, which are then straightened by the ram. Both the roller carriages and the ram are under easy control of the operator in any position.

Hydrostatic Forcing Press.

FOR forcing in or out shafts, pinions, hubs of pulleys, and all other similar work.

It can be used for forcing machines into work to be turned, and for a great variety of purposes about any machine shop.

It insures a perfectly true fit, prevents bruising the work, and performs the operation in the shortest possible time.

Any required pressure from 1 to 150 tons on the ram may be exerted.

The Press is built on the general construction and operation of our Car Wheel Presses, heretofore described.

Two pump plungers are used, the operation of which is controlled by our patented device.

The ram is 9 inches diameter. Cylinder is made of cold-blast iron and is copper lined. The resistance is taken by wrought iron tie bars of ample strength. Clearance between the bars, 48 inches.

Resistance post has an opening to admit a shaft 14 inches diameter. Greatest distance between ram and resistance post, 14 feet 2 inches.

The advantages of such a machine in engine shops, or general machine shops, are numerous, and we feel will give better work at reduced cost.

MISCELLANEOUS TESTIMONIALS.

Chesapeake & Ohio Railway Co.

OFFICE SUPERINTENDENT MOTIVE POWER,
Niles Tool Works, Hamilton, O. RICHMOND, VA., Feb. 7, 1891.

Gentlemen:—Replying to your favor of January 16th, inquiring about new tools purchased by this company from you, would say that all of them have given entire satisfaction, and I know of no reason, should we be in the market for more tools, why we should not go to you for them.

Yours truly, WM. GARSTANG,
Superintendent M. P.

Pittsburg & Lake Erie Railroad Co.

Niles Tool Works, Hamilton, O. CHARTIERS, PA., Jan. 22, 1891.

Gentlemen:—Referring to your letter of January 16th, while we do not desire any particular notoriety by occupying a space in your new catalogue, we cannot help but say that all the tools purchased of you have given us good service, and we have no fault whatever to find with them.

Yours truly, L. H. TURNER,
Master of Machinery.

Cincinnati, New Orleans & Texas Pacific Railway Co.

OFFICE OF SUP'T OF MOTIVE POWER AND MACHINERY,
Niles Tool Works, Hamilton, O. LUDLOW, KY., Jan. 30, 1891.

Gentlemen:—In response to your inquiry of the 16th inst., having reference to my opinion of the tools of your make which are in use in the shops of this system, I wish to say that all of them, from the Driving Wheel Lathe to the 20-inch Lathe, Screw Machine, Horizontal Boring and Drilling Machine, Planer, etc., are giving first-class satisfaction, answering our requirements to the full extent of our anticipations. Yours truly, JAMES MEEHAN,
Superintendent M. P. & M.

The American Tool and Machine Co.

Niles Tool Works, Hamilton, O. BOSTON, MASS., Jan. 28, 1891.

Gentlemen:—Please advise me of your price and time of delivery of the following: One 12-foot Boring and Turning Mill, with Key-seating Attachment; one 60-inch Boring Mill; one 30-inch (or your largest size) Slotting Machine. The 8-foot Boring and Turning Mill bought from you in 1881, together with the 50-inch Boring Mill and 24-inch Slotting Machine, and the 10-foot Boring and Turning Mill with Key-seating Attachment, with the 60-inch Boring Machine received from you in 1888, have, one and all, served our purpose so exceedingly well that we shall not think of filling our wants from elsewhere; but trust that you will not (while stating your prices), take advantage of this confession, but, to the contrary, because of our loyalty to you, we shall expect you to favor us as much as you can possibly afford.

Yours very truly,
THE AMERICAN TOOL & MACHINE CO.,
BENJ. F. RADFORD, President.

INDEX.

	PAGE
Axle Lathe, Single,	25
" " Double,	27
" Cutting Off and Centering Mach.,	21
Arch Bar Drill, 6 Spindles,	191
" " 8 "	191
Boring and Turning Mills,—	
" " 60 in. swing,	133
" " 6 feet swing,	135
" " 7 "	135
" " 8 "	135
" " 10 "	135
" " 12 "	137
" " 14 "	137
" " 16 "	137
" " 10-16 "	139
" " 14-20 "	139
" " 16-24 "	140
Boring Mill for Tire, 5 ft. Swing,	140
" " 6 "	140
" Attachments,	141
Boring Machine, Car Wheel,	29
" Chord,	151
" Cylinder No. 1,	153
" " " 2,	153
" " " 3,	154
" " " 4,	154
" " " 5,	155
" Crank,	173
" Double,	161
" Pulley,	213
Boring and Drilling Mach., Horizontal,—	
" " " No. 1,	157
" " " " 2,	159
" " " " 3,	159
" " " " 4,	161
Boring, Drilling and Milling Machine,	163
Boring Machine, Special Vertical, 50 in.,	213
" " 60 "	213
" Vertical Turret,	149
Bending Rolls, 4 to 6 ft., No. 2,	223
" 6 to 10 " " 3,	223
" 10 to 14 " " 4,	225
" 10 to 12 " " 5,	227
" 16 to 20 " " 6,	227
" Ship Plate, " 8,	227
" " " 10,	229
" " " 12,	230
Car Axle Lathe, Single,	25
" " Double,	27

	PAGE
Car Wheel Boring Machine,	29
" Drill, 4 Spindle,	200
" " 27 "	201
" Lathe,	17
" Press, No. 1,	31
" " " 2,	33
Chord Boring Machine,	151
Crank "	173
Cutting Off Lathe,	21
Cylinder Boring Machine, No. 1,	153
" " " " 2,	153
" " " " 3,	154
" " " " 4,	154
" " " " 5,	155
" Lathe,	215
Double Boring Machine,	161
Double Cutting Off & Centering Mach.,	21
Double Multiple Drilling Machine,	195
Drills, No. 2, Vertical, 24 in.,	179
" " 2, " 30 "	179
" " 5, " 50 "	181
" " 6, " 60 "	181
" Radial, No. 1, 5 ft.,	187
" " " 2, 6 "	187
" " " 3, 7 "	189
" Arch Bar, 6 Spindle,	191
" " 8 "	191
" Car Wheel, 4 "	200
" " 27 "	201
" Multiple,	193
" Double Multiple,	195
" Multiple, Traverse Table,	197
" Rail, 2 Spindles,	203
" " 3 "	203
Drilling and Tapping Machine,	199
Driving Wheel Lathes,—	
" " 60 in.,	15
" " 66 "	15
" " 69 "	15
" " 79 "	15
" " 84 "	15
" " 90 "	15
Driving Wheel Press, No. 3,	33
" " " 4,	33
" " " 5,	33
Forge Lathe, 50 in.,	77
" " 60 "	79
" Slotter, 24 in.,	119
" " 54 "	121

PAGE

Frog Planer, ... 95
Forcing Press, ... 241
Grindstone Box, ... 239
Horizontal Boring and Drilling Mach., .
" " " " No. 1, 157
" " " " " 2, 159
" " " " " 3, 159
" " " " " 4, 161
Horizontal Boring, Drilling and Milling Machine, ... 163
Hydrostatic Car Wheel Press, No. 1, . 31
" " " " 2, . 33
" Driving Wheel Press, No. 3, 33
" " " " " 4, 33
" " " " " 5, 33
" Forcing Press, . . . 241
Lathes, Axle, Single, ... 25
" " Double, ... 27
" Car Wheel, ... 17
" Cylinder, ... 215
" Driving Wheel, 60 in., . . 15
" " " 66 " . . 15
" " " 69 " . . 15
" " " 79 " . . 15
" " " 84 " . . 15
" " " 90 " . . 15
Lathes, Engine, 18 in., ... 71
" " 22 " 71
" " 26 " 71
" " 30 " 73
" " 36 " 73
" " 42 " 74
" " 48 " 74
" " 54 " 75
" " 60 " 75
" " 72 " 80
Lathes, Forge, 50 in., ... 77
" " 60 " 79
Lathes, Pulley, 40 in., ... 211
" " 50 " 211
" " 60 " 211
" Shafting, ... 73
Multiple Drill, ... 193
" " Double, ... 195
" " Traverse Table, . . 197
" Drilling and Tapping Machine, 199
" Wheel Drill, 4 Spindle, . . 200
" " " " 27 " . . 201
Planing Machines, 26 in., . . . 91
" " 32 " . . . 91
" " 38 " . . . 91

PAGE

Planing Machines, 44 in., . . . 91
" " 48 " . . . 91
" " 54 " . . . 93
" " 60 " . . . 93
" " 72 " . . . 93
" " 84 " . . . 93
" " 96 " . . . 93
" " 120 " . . . 93
" " Switch, 36 x 12 in., . 95
" " " 36 x 36 " . 95
" " Plate, No. 1, . . 97
" " " " 4, . . 99
" " Double Plate, . . 101
Plate Bending Rolls. See Bending Rolls.
" Straightening Rolls, . . . 233
Pulley Boring Machine, 50 in., . . 213
" " " 60 " . . 213
" Lathe, 40 in., ... 211
" " 50 " 211
" " 60 " 211
Quartering Machine, ... 23
Radial Drills, No. 1, ... 187
" " " 2, ... 187
" " " 3, ... 189
Rail Drill, 2 Spindles, ... 203
" 3 " 203
Screw Machines, No. 2, ... 61
" " No. 3, ... 63
Shafting Lathes, ... 73
Shaft Straightening Machine, . . 240
Shaping Machines, 16 in., . . . 111
" " 18 " . . . 111
" " 24 " . . . 113
Slotting Machines, 6½ in., . . . 117
" " 10 " . . . 116
" " 14 " . . . 116
" " 18 " . . . 116
" " 24 " . . . 119
" " 54 " . . . 121
Straightening Rolls, ... 233
Switch Planers, ... 95
Tire Lathe, ... 17
" Boring Mill, 5 ft., ... 140
" " " 6 ft., ... 140
Turret Boring Machine, Vertical . . 149
Wheel Lathes. See Lathes.
" Presses. See Hydrostatic Presses.
" Drills. See Drilling Machines.
" Quartering Machine, . . . 23
" Boring Machine, ... 29